

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

OCT. 4, 1954

50 CENTS



WIDGEON



MALLARD

ALBATROSS



## KNOWN FROM DJIBOUTI TO NARSARSSUAK

Like the five place Widgeon, the executive transport, the Mallard, is in service with companies and private owners throughout the world. The present production amphibian, the Grumman Albatross, is in global operations with the USAF Air Rescue Services, the Navy, and the Coast Guard. All told, Grumman has built more amphibians than any other company in the

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# How Sundstrand Constant Speed Drives meet exacting requirements of modern aircraft!



## Rugged reliability

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## Lightweight, compact design

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## Versatile in application

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## Close control to provide parallel operation

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Model "Bridge-Type" Drive—used for engine-driven hydraulic pumps in low rpm power take-off and



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Model "Package-Type" Drive—compact with engine drive shaft

RESEARCH KEEPS **B.F. Goodrich** FIRST IN RUBBER



## Diamond Alkali's executive plane crew reports: "Less tire wear, no ice worry, no brake maintenance..."

YOU MAY recognize Chuck Wheeler (right). For 22 years, he was a pilot for a major airline. Now, he's still flying, but now he's trying efforts of the Diamond Alkali Company all over the United States.

We caught up with Chuck's DC-3 crew at their home base—Los Angeles Airport, Wilmington, Ohio. This time we wanted a story on their B.F. Goodrich experience.

Right off we asked how to liked B.F. Goodrich Diamond Tires. They cut and took less than regular tires, replied Chuck. "A feature we certainly appreciate when landing on rough runways," he continued.

We asked Hank Spawack, the plane's

mechanic, about brake maintenance. "No maintenance at all," he said. And he mentioned that in 900 landings. Speaking of B.F. Goodrich Rapid-Tube Tires, Art Jones, co-pilot (lower left) added, "We chose them because they work especially well in bad weather."

Nickar pilots over reasons about wing ice. "Our B.F. Goodrich De-Icers never let us down. In winter we can fly above bad weather," they explained. They reported they've had no worries about grip on runways with B.F. Goodrich Anti-Road Fluid Foot Shoes. Maintenance? None.

Before we left, Chuck Wheeler mentioned that they were so sold on this

B.F. Goodrich equipment that all of them have B.F. Goodrich Life-Saver Tablets on their cars.

This interview is more proof of what we've been saying right along. That to get the best in safety and dependability is a good idea to consult with B.F. Goodrich engineers before you equip your plane. Order B.F. Goodrich products for aviation include: Pressure-Sealing Wheels, Avionics, inflatable seats, fuel cells. Systems accessories. The B.F. Goodrich Company, Akron, Ohio.

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Spring and stupe  
assembly

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## NEWS DIGEST

### Domestic

Lockheed XP/V is being fitted with a modified Allison turbo-prop engine, and the Navy removal-tailoff fighter will arrive at flight test program within a few weeks. Meanwhile, Canada is flight testing the XTV-2, Navy's version VTO, at Brown Field near San Diego.

Third A-40 Skyhawk produced by Douglas Aircraft Co. at El Segundo, Calif., has made its first flight. Some changes have been made in the light weight Navy attack aircraft as a result of flight tests of earlier models. Weight at the time has been increased to give a higher angle of attack on take off for better carrier performance.

105 turbojets coming off Wright Aircraft's production line at Wood Ridge, N. J., are developing about 7,500 lb. thrust, although official rating is 7,200 lb.

Frederickson have set up a three-man committee to select a new Washington, D. C., representative for the 14-member conference of local aircraft makers by Nov. 1 to replace Donald Noyes, who resigned Oct. 1 to become president of Northrup Aircraft Division (Aeronautics Week Sept. 6, p. 77).

Sen. Pat McCarran, 75, author of the 1948 Civil Aeronautics Act and the 1949 Airport Development Act, early supporter of an independent U. S. Air Force and sponsor of a comprehensive bill revising and codifying civil aviation law, died last week.

First F-900s slated for an operational USAF squadron now are ready for delivery at North American Aviation's Los Angeles plant. They will be assigned to George AFB, Victoria, Calif.

First turbo-prop simulation for the Lockheed C-119 will be designed and built by Convair-Wright Corp.'s Electronics Division at Wood Ridge, N. J., under an Air Force contract.

Lockheed F-80K, USAF's first operational jet fighter to set a world record, is being put in the Air Force technical museum at Wright Air Development Center, Dayton. The F-80K's record 621.5 mph, set June 10, 1947.

Alison J37-A-35 operated 1,400 h without overhaul at Tyndall AFB, Fla., a service representative reports.

Finechild Engine & Airframe Corp.



### British Fly VTO Testbed

An early phase in Britain's development of piloted vertical-takeoff aircraft has begun with first two flights of the "flying testbed" built in Rothwell. The VTO climbed to about 25 ft. in early flight. Powerplants are two Rolls-Royce Naar jets, mounted horizontally, upward, with their exhaust ducts downward, beneath the pilot. The first and its smaller test air did most of the pre and possibly stabilizing forces required for the pilot by a conventional control column and control pedals.

### International

Two-engine-powered, international that uses two multi-blade, rotary jet has recently in the wings is being developed by France's Louis Breguet. During take-off and landing, rotor over and under the rotor with distinct three slipstream for thrust control. In forward flight, the rotor clear and normal jet power is used. First flight is expected in three years.

Airport competition for the North American F-100 (Aeronautics Week Sept. 13, p. 11) has been won by Mustang in Harrier's new E-11.

Convair Aircraft Co., Wichita, has received a \$1 million order to deliver 100 from Lockheed Aircraft Corp. for work on the T-33 jet trainer.

U. S. high-phone business dropped 347 miles and recorded aircraft at a cost based value of \$1,679,000. During August, jumping total deliveries for the first eight months of 1954 to 2,157 at \$17,220,000. Aircraft Industries Association.

Two-place TF-56, North American Silver jet trainer, has started a tour of Air Force bases. First TF-56 crashed last March (Aeronautics Week Mar. 28, p. 313).

Avon Canada's CF-95T is being traded by two officials of British's Hawker Siddeley group. In Toronto to inspect the new supersonic delta wing fighter (Aeronautics Week June 14, p. 11) are Sen. Frank Spence, Hawker Siddeley president; Sen. Thomas Sweeney, board chairman, and Sen. Rex DeLoach, managing director.

Swedish J29, new version of Sweden's supersonic jet fighter, will have a modified delta wing to ease the aircraft's critical Mach number and improve its transonic flight characteristics. The fighter plane's de Lockheed Ghost turbojet now is being fitted with an afterburner.

## 1

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## WHO'S WHERE

### In the Front Office

**Ronald L. Whelan**, general manager of Sikorsky Aircraft Division of United Aircraft Corp., has been elected a vice president of UAC and, along with **Rick Martin**, general manager of UAC's Hamilton Standard Division, appointed to the UAC operating and policy committee. **Bob Whelan** and **Walt** will continue as general managers of this respective division. Martin became a vice president in 1972.

**Max King** has stepped up as vice president advertising and public relations for South west Airlines.

**Edward A. Ratto** is now general manager of Pacer's Helicopter Co. of Canada Ltd., Amherst, Ont., according to J. G. Chabon, who resigned.

**John W. Kelly** has become vice president engineering for General Motors Corp.'s Aerial Division, Pontiac, Michigan. **Laurel F. Finelli**, assistant general manager and secretary-manager of Bell Aircraft Corp., has been elected a director of Associated Industries of New York State, Inc.

### Changes

**E. M. Miller** has been promoted by Lear, Inc., to assistant general manager of the Research and Development Division, Southfield, Mich.

**Charles W. Sewell** is now general sales manager of American West Coast subsidiary, Aero-Graphics Corp., Burbank. **William O. Roschen** has been appointed sales director for Anair, Inc., Woodside, N. Y.

**H. G. McDonald** has become technical information manager for Westinghouse Electric Corp., Pittsburgh, succeeding C. A. Sackett, who has joined General Electric's Institute at Palo Alto, Calif., as manager of technical information services. **R. W. Dodge** is now editor of the Westinghouse Engineer magazine.

**Ruben F. Chao** has been named chief engineer for Villach's Electrical News, becoming Co. Electronics Division, Los Angeles.

**Frank G. Andrews** has joined the faculty of the Flight Safety Training Course at the University of Southern California, Los Angeles.

### Honors and Elections

**Andrew B. Stein**, president of Pan Amco on Coast Airlines, has been awarded Chief's Order of Merit, grade of Chief Commissioner, for his work in developing the airline.

**Josephine Corbetta** first woman to fly solo this month, has won the International Air Federation's Gold Medal as the outstanding pilot of 1974.

**Lo. Col. Fred J. Sweet (USAF)** has been elected president of the Young Society of Aeronautics, according to **Joe D. Giam**, SJA officer awarded his 1974-1975 D. Willing, group chairman, honorary vice president, **Capt. Ralph S. Bently (USAF)**, first Coast vice president, **Robert Nelson**, West Coast vice president, **R. J. Brown**, treasurer and **Paul A. Schwartz**, secretary.

## INDUSTRY OBSERVER

(Editor's Note: This column was written by **Aviation Week** editors who attended the SBAC flying display at Farnborough, the IATA meeting in Paris and visited airlines and aircraft plants in Europe.)

Aircraft growth and engine innovations are in the midst of an intensive sales campaign among European airlines aimed at convincing competitors from British gas turbine equipment. Boeing team headed by sales manager **Ralph Bell** is pushing the enlarged version of the Model 747 jet transport. **Georgios** officials, led by **Arthur Raymond**, vice president for engineering, and **Nat Fackell**, vice president for commercial sales, are talking DC-7C for carrying transatlantic operations. Pratt & Whitney Aircraft men are trying to attract foreign airlines to the new superpowered version of the Wing Major for possible use on the DC 7. Lockheed is pushing its T74 powered Super Constellation.

European airline chiefs are bawling with rumors of Douglas Aircraft's twin-engine gas turbine-powered helicopter project aimed at replacing the DC3 in the world airline market. Indications are it will be a 40-passenger version giving 9,000 lb. and powered by two gas turbines offering single engine performance. It is equipped with seats located on each side of the fuselage rather than face and aft as in Pirelli designs. Douglas is extremely interested in the Rolls-Royce R. B. 109 turboprop of about 1,000 hp in a powerplant for this helicopter.

American Salsbery Motors has expanded a special motor division to push development of liquid-fueled rockets. Firms already has developed Salsbery, a 2,000-lb. thrust, liquid-fueled rocket and is working on the Scramjet, a project still under review stage.

Heinkel's Heinkel now has its last Boeing. Adena group consisted is a reasonable amount package similar to the arrangement of success in the Boeing 747-15.

International Air Transport Association organized a helicopter convention at its Paris meeting under the chairmanship of A. V. J. Vignarone, former transport partner and operations manager of Sabena Belgica Aviation. First meeting is scheduled for November in Montreal. Membership will be open to non IATA members who are engaged in helicopter transport operations.

De Havilland has its Super Spite cold rocket package, for quick attachment to fighters and bombers for auxiliary takeoff and climb power. Super Spite package has pneumatic engine gas to flow down after it is jetted from dual airframe planes. The rocket produces 4,200 lb. thrust for 40 seconds and weighs 1,900 lb. fully installed with fuel in the prize package.

The French are interested in obtaining the Pratt & Whitney Aircraft J57 turbine to power the Sud-Cat Vautour helicopter, scheduled for production for the French air force and NATO units. The Vautour is a twin-engine powered attack plane in the 500-mile class, powered by two Sures Air J11B turbines. USAF security authorities are likely to kill this deal, once policy refuses to allow foreign export of the J57.

Heinkel is developing a variety of drop tanks for British aircraft, including specially tailored drop tanks for language versions of the Canberra bomber. One 100-gal. drop tank design has been successfully test flown on a Heinkel Heinkel at separate speeds.

IATA member airlines are taking a closer look at mass-class service on the coast aircraft with a view toward showcasing the air. A great number are finding that they will be raising passengers in an area which may be crowded while having empty seats in the other section.

In another effort to reduce fuel-burn expense cost, IATA airlines are attempting to prevent manufacturers with specifications for a drop turbine fuel in the hope that they will design their engines accordingly.



FROM HEART OF BRUSSELS, at heliport only a few minute walk from center of the town, Sabena S-55 leaves on scheduled flight.

## Sabena Maps Big Copter Service Buildup



ARRIVING AT AIRPORT, S-55 descends now, load wing transports arriving its passengers.



PASSENGERS DISSEMBARK from Sabena Sikorski, being helped with baggage attendants.

By Robert Blot

**Brussels**—A major expansion of transport helicopter operations is planned by Sabena Belgian Airlines as a result of 12 monthly operations of the world's first scheduled transport copter service.

Sabena now operates a 650 mile passenger and mail network with four Sikorski S-55 helicopters.

Major features of the expansion plan, described to AVIATION WEEK by Sabena officials are:

- Construction of a 53-building downtown rooftop heliport building at the hub of the new copter network. Site of the present Sabena surface heliport is a five minute walk from the center of the Brussels business district.

The heliport is planned to be built in three increments. The first, aimed at being operational in 1955, will cost \$11 million and will handle as many as six twin engine, 40 passenger copters at the same time.

- Expansion of the present single engine helicopter services next year to

top such new markets as the prosperous Geneva-Rome and the Saar districts.

- Development of an advanced copter network, within a 250 mile radius of Brussels is being actively planned. This service must meet homogeneous copter carrying 40 passengers and cruising more than 190 mph.

Sabena officials told AVIATION WEEK the first year's operations convinced them they are on the right track with their line of helicopter development. The airline ended its first copter year Sept. 1.

► **Population Factor**—The key to Sabena's intense interest in helicopters is a combination of geography and population that has Brussels in the hub is an area containing 74 million people and 193 towns, each with more than 30,000 inhabitants.

All of this is within a 200 mile radius of Brussels, including the German Ruhr and Saar, the great parts of Aulwerp and Rotterdam, the lower under take areas in northern France and Belgium and the great population centers of London and Paris.

In contrast, a similar circle around New York City would yield only 21 million people.

Sabena believes that is the best territory in the world to develop transport copter operations. It provides heavy dividends if tapped correctly, says the airline.

► **Future Planning**—Sabena cites three major points learned during the first year's operations of regularly scheduled passenger, mail and express service that paved the way for future copter development. They are:

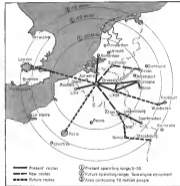
- Helicopter service proved reliable. The Sabena airline flew 28,800 passengers and 6,000 boxes with a perfect safety record. During that period, Sabena had only two engine failures and both were minor and automatic forced landings.

Schedule reliability was 95%. This is a good figure considering the copter is subjected to more flight conditions and operational handicaps than all aircraft.

The worst month was June December, with 61% of scheduled operations carried out. Since March, schedule reliability has ranged better than 80%, with a high in August at 97%. This is not bad compared with similar early days of fixed-wing transports. Sabena averaged a surprisingly high six hour daily utilization of its copters, equalling the Belgian line's Conquest record.

- Helicopter service proved to be a genuine feeder for fixed-wing services, pouring in 5,100 passengers to Sabena's Conquest service to the Congo, the C-53 and Conquest France in support of direct connections at Middelburg Airport, the airline's Brussels terminal.

The additional revenue gained by



PRESENT AND FUTURE POTENTIAL for Sabena's copter service is shown on this map.

Sabena from these passengers, some diverted from competing airlines, enabled the Belgian carrier to break even on the first year of copter operations, even though the direct operating losses that was the real Sabena is covering heavily on replacing passengers through the Brussels hub because of attractive copter connections in the surrounding territory.

► **The helicopter** carried a demand for a new type of reference for air transportation Europe. About 15% of the copter passenger time before had flown in one type of aircraft. Most of these customers flew on numerous business and not in passenger flights concerning business services.

Sabena now is engaged with requests from the transportation of boxes in Geneva, Middelburg, Belgium and France to extend the service, linking their own territories with the copter network. The airline is convinced of the soundness of tapping this new market, although equipment problems prevent immediate full exploitation.

► **Fast Copter Net**—Although Sabena plans a limited expansion of its present service with Sikorski copters—arguing for the present at an additional pair for the new service—major expansion awaits the arrival of a new type of transport copter featuring 40 passenger capacity, more engine with single en-

gine performance, faster cruising speeds and increased flight capabilities.

The Sikorski S-55, now getting into production at Bridgeport, Conn., appears to be the best bet at the moment. But there is intense interest shown by Sabena and other potential European operators such as Air France, KLM, Royal Dutch Airlines and British European Airways in the new Douglas helicopter project (See page 11).

Quantities of S-55s on gas turbine-powered helicopters because of inherent passenger comfort and eventual noise reduction.

Older aircraft during the 15,000 Sikorski helicopter landings and take-offs from European cities in four countries, Sabena received only one complaint from local residents.

► **1955 Goal**—Sabena is confident that twin engine commercial helicopter will be operational in 1955 and is giving consideration of its downtown Brussels heliport surroundings. The Belgian airline plans to bid for operations in time for the Brussels 1955 International Exposition.

The heliport is an absolute prerequisite. Sabena believes the rooftop heliport is the answer to long commercial operations.

"Unless you bring the helicopter to the city center you lose the biggest competitive advantage," says A. V. F.

### Exclusive Series

This is the first in a series of 15 shows AVIATION WEEK presents on Sabena's experience in operating the first international scheduled helicopter transport service to the massive hub of Aviation Week, who flew the helicopter service and interviewed key Sabena officials.

Vermorel, Sabena's operations manager and a former captain long before he operated into war zones where he cannot get downtown landing rights.

► **Destination Topped:** The new Brussels airport will be the first station high with the landing platform 35 feet above the ground, topping all surrounding obstructions.

The new Brussels-to-Amsterdam high will cut through the first floor, flanked by four square tower lanterns supporting a jet-erected concrete roof. There is no critical column support for the landing platform. The roof is stressed to handle 10,000 lb. capacity up to six at a time and must 15,000-lb. capacity in 5 ft.

The passenger, mail and freight terminals and commercial offices will be housed in the first colonnade. The colonnade is the new airport's main artery and is used as a parking garage for the convenience of passengers using the airport service.

An aircraft ramping elevator operates from the road, loading provided by the maintenance shops on the floor below.

Sabena believes holding area notes will be needed but tail holding will not be necessary with its 100-in. diameter. Provisions for a bus station also are made on the first floor to speed passengers to their connections for alternate destinations.

The actual Sabena routing indicates few delays in the network, with good investment since this will gather routes from commercial office space.

► **Three-Stage Expansion:** Sabena plans its airport expansion program in three stages in the following chronological order.

► **Fast Connector:** Sabena will operate fast wing service on short hauls up to 150 miles. Key to this competition is service from center to center by helicopter.

Vermorel believes that Sabena's expansion plan experiments he has made with flights from Brussels to London and Paris prove that copiers can cut the center-to-center time of fixed wing flights and airport losses by half (Aerobus Week Aug. 31, p. 22). The average speed now of this foundation averages 37 mph. From the 10-mph average speed of the 540-knot early exceeds the combination time.

► **Example:** Time from Paris to Brussels now is three hours 25 minutes by the fixed wing and two combinations. Sabena flew a heavily loaded, 500-lb. from the Brussels airport to downtown Paris, landing in a park opposite the Invalides central bus terminal, in one hour 55 minutes. Another example is Sabena's 45-minute flight from the center of Brussels to downtown Rotterdam, compared with two hours

### High Flyer

Cosmo's helicopter RIV being lost in rocket altitudes of 10,000 ft. during air test program. The high-flying RIV suspended at least one Navy jet fighter pilot, who kept back for a second look after discovering the big plane at the altitude.

Another Cosmo airplane, the NF1V, is being modified to a single-seat configuration. She did not show in recent photos of the FFV undergoing test time at sea, but that model still is equipped with radio aids.

to Paris and two hours 18 minutes to Rome.

Sabena reports require one hour 35 minutes for a flight from the center of Brussels to Brussels with a single connection and immigration check, compared with hours on a rail trip through Geneva, Dutch and Belgian border controls.

The average air speed between European terminals is 39 mph., reduced to 21 mph. when flown across the channel (see report). With the 100 mph. cruising speed of new helicopters, Sabena predicts a large upswing of business from routine traffic.

Paris are the competitive problem in this type of business. Sabena contends that the copier will be more expensive to operate than the helicopter, but the fixed-wing transport. However, the airline also feels that in order to compete it must keep copiers that equal to those of fixed wing transport.

This allows the helicopter an actual fast advantage, consequently, some charges for airport fees and other extra, not necessary with copier service, must be added to the fixed wing price.

► **Schedule:** Sabena plans to use its extension of the copier service to lay new routes for its fixed-wing long-range services. Most locations in the Belgian land's present and future network do not have airports. It requires a two to four-hour drive to reach the nearest fixed-wing terminal. By providing fast, convenient connections to Sabena services by way of Mithelbeek, the carrier hopes to guarantee new airline business on a significant scale.

Sabena estimates that in the future it can get 25% of the copier passengers onto fixed wing services and the remainder will support the direct operating costs of the helicopters.

► **Third:** Sabena will use the helicopter to create a new type of interurban air traffic. The airline feels that most of the 17% of its passengers who lost yet needed by helicopter for these fast flights represent the beginning of the interurban traffic.

The geographic location of Brussels appears to offer Sabena a better position of developing the type of operation than most other European airlines. The area within 150 miles around Brussels is a busy industrial and trading region, traversed actively by businessmen.

Sabena must create new airports for this traffic.

► **Profit Key:** The key to profits in this type of service is frequent stops to pick up and discharge passengers. Sabena is strongly concerned that time on the ground severely cuts block speeds, and the airline is developing special techniques that cut the ground time in an average of three minutes per stop. The Belgian carrier also is showing great interest in exploring local fares and operations to generate interurban traffic.

The most successful to date was an elderly executive during the spring on the day fields of Holland. Sabena flew 4,000 passengers over the trip fields at an altitude of 100 feet and provided a stop for inspection from the ground and a visit to a famous Dutch museum. The resulting fast from Brussels, including lunch, was 52%.

Since the regular transport schedule operates only on weekdays, Sabena kept its copiers busy on Sunday flying from to Waterloo, battlefield from Brussels. These trips were so popular that Sabena had to limit them because the pilots were exceeding their weekly flying time quotas.

► **U. S. Touring Office:** Next spring Sabena hopes to develop the trip field soon from its air way to the U. S. by offering a package tour to U. S. agents that would include the trans-Atlantic flight and a special convenience of the trip fields in field views.

The Belgian airline now operates four daily roundtrips on routes from the hub at Brussels to Rotterdam, Lille, Lege and Cologne-Bonn and a 27th mile north. The flight passes through Belgium's coal-mining district.

A total of 20,000 passengers was carried by Sabena-11,000 on the regular routes, 4,000 on trip field excursions and the rest on governmental trips.

Skimming up the first year's experience, Vermorel said: "We now know that we are on the right track and we know in which direction to move for the future."

### Some F-107 Details

North American Aviation's F-107 day fighter fighter will have an extremely thin 5% wing. Sweptback, it is more in F-106.

The F-107, designation for the F-106B, is scheduled for an improved version of the F-106 by North American. It will carry a 15,000-lb-thrust engine. It will carry a rocket as the nose, with the air scoop underneath.



R4000 is new code name given to USAC Type 70, large twin jet loader, shown for first time in the official effort's description.



USAC in code name for USSR Type 17, large jet heavy bomber, similar in size to USAF's lightjet Boeing B-12 Stratojet.

## U.S. Tags Combat Names to Red Planes

U. S. armed forces are assigning code names to Russian military aircraft and soon will use training aids to speed recognition by pilots in event of enemy attack. The code names are gathered after the pattern used in World War II for Japanese aircraft.

Twelve Soviet planes in use have been listed and more designations will follow with distribution of training and charts showing silhouettes and patterns of known Red aircraft with their main nose designations and code names.

► **Red Airpower:** Disclosure of the new program followed publication of an evaluation of Soviet air capabilities in Moscow, January News, official publication of the Chief of Naval Operations and the Bureau of Aeronautics. So, the code names were used for the first time.

The article also included the first photos, as well as drawings, of the new intercepting twin jet loader named in Moscow at this year's May Day celebration.



B-12 is twin jet heavy bomber with more than 600 sq. miles, designed to home shipping.

Washington, D.C. based, from actual photographs.

The magazine's evaluation of Red aviation is concerned entirely with Soviet ability to attack Allied shipping and offshore oil and gas installations in the event of a war in Europe. There is little mention of strategic or tactical use of the aircraft in land missions.

► **F-1, B-2 and C-130**—with code names in the article.

► **Recon**, a new jet, sweeping bomber first depicted at the Maastricht exhibition in Moscow. It is similar to the Boeing B-12 in size.

► **Badger**, a two-engine, high-altitude bomber.

► **Wolf**, a copy of the U.S. B-29 medium bomber. It is known as the Tu-4.

► **Butcher or U-28**. This is a two-engine, high-altitude version of the B-29, due in 1946.

► **Recon**, first jet bomber with a straight wing, said by Russian navy.

► **Wolf**, the B-4 described in an October magazine profile bomber.

The U-28's lighter skin is also noted, but no code name is given for the aircraft.

Following publication of the *Naval Aviation News* story, the Navy disclosed six additional code names for bombers. They are: **Tiger** (Tu-16), **U-28** (Tu-95), **Goose** (B-29), **Black** (B-21), **Hat** (Tu-22) and **Bomb** (B-11).

These names include the code name which will not appear beginning with 1 for fighters, 2 for bombers and C for cargo or transport types.

► **Six Middle-East**—Russian Navy says the Red force base, includes about 20,000 aircraft. From the Navy's viewpoint, the Middle-East air bases would be capable of attacking Allied air movements in those areas.

► **B-2**, "concentrated on action over water," contains in most recent issues lighter range of 500 to 600 miles (400 to 120 nautical miles).

► **B-2**, effective low altitude attack, in closing attacks on merchant convoys and naval vessels, out to 600 nautical miles from Soviet bases may get light bombers.

► **B-2**, low-altitude and attacking bomber beyond 1,000 nautical miles from base at home, said Tu-4, B-29, B-29, medium bomber or transport, sweeping medium bombers operating at medium or high altitudes. These planes also could launch reconnaissance and diversion to Soviet submarine attacks on shipping.

The magazine says Russia does not have any aircraft carrier, but the Red navy has surface units operating from those bases.

In the event of a war in Europe, predicts the *Kommunist* article, that a blockade of the continent would not be serious.

This would be true if the Red aircraft

operated on schedule in overrunning the defenses. If the latter, the magazine says, Russia already has as much as launch attacks on Allied shipping in the English Channel, the North Sea and the Atlantic, and even port in Mediterranean Europe.

► **Reconnaissance**—"The ability of Soviet naval aviation to carry out its reconnaissance mission is limited by its size," the article reports. "If the Soviet navy, therefore, to utilize the Red (Tu-4) for naval purposes, they could assign some to the navy as could order the B-29 to perform over missions."

The Soviet's B-29 (B-29) might light bomber and a later transport bomber, with approximately the same capabilities can both carry a greater

payload load of approximately twice the speed of the obsolete B-29 (B-29) two-engine propeller bomber.

When a combat mission of more than 600 nautical miles, these two jet aircraft should be formidable weapons in any shipping attack. For missions beyond the 600 nautical mile radius, the larger sweeping bomber bomber aircraft says in May should be even more formidable with their increased performance.

The magazine says Russia will be prepared to enter conflict with the West more than twice the number of aircraft than the West has on land when they fight World War II. It adds that Moscow is determined not to lag in the development of weapons.

## Trends In Subcontracting—Second in a Series

### Small Business Fights for Survival

Specialists and jobbers organize in their bid for more AF contracts, cut internal costs—such as research.

By William J. Gough

Los Angeles—An economic report last week under any strong industry subcontracting is being watched closely by both industry and government officials. It is not yet a crisis, it could be. The economic outlook has been pessimistic, by several developments that followed the conclusion of the Korean war.

► **Air Force contracts and subcontracting**—The war only has reduced the dollar volume of government spending not able to shift business to prime contractors but many major defense plants are reducing the amount of subcontracting work due to the increased costs available to their own facilities.

► **Intense price competition**, based by an excessive number of firms competing for a much smaller volume of business.

► **Increasing complexity of orders** as well as studies, reducing the number of firms small business is capable of producing (*Airweek* Winter Sept. 27, p. 10).

► **Threats**—The situation contains threat factors to the well being of the aircraft industry.

► **More small firms** are being forced out of business at out of the aircraft industry, assuming the laws available to the "Big Two" are not changed.

► **Research and development efforts** in the aerospace and component fields are being cut back.

To meet the loss competition, aerospace and component manufacturers are reducing prices, cutting in the past years there are not enough funds available for research.

► **Interviable Goals**—One sector relies

on the gathering stream in the recent formation on the West Coast of two organizations of subcontractors. Last week of three plans represents into a national association.

While not competing openly with the Aircraft Industries Assn., it is inevitable that these groups will clash with an intense manufacturer on the question of subcontracting being done by the planes.

There seems for organizing a simple. That would be to maintain a large volume of subcontracting. The industry is not entirely satisfied. Small business leaders believe they can do a better job on many contracts at lower cost than large contractors.

It is not clear that a hand away from subcontracting was desired, a signifier of the industry that is valid in this case of emergency.

► **Intensive Design-Top Air Force** officials say to WPA, and C-1, continued over the design inherent in the situation, are faced with the problem of drawing how much subcontracting is necessary to keep the industry together. Can government-owned facilities, or private contractors be allowed to avoid this in order to maintain the present subcontracting pattern?

At what point does this begin to threaten the industry's future? The industry's debt to cut costs wherever possible?

USAI is seeking a compromise solution but is finding it difficult to know at what point to begin to compromise.

► **The "Giant"**—The industry's opinion on the question of the situation is changing the issue further, just how critical is it?

"These difficulties are not an economic crisis," says government officials' assistant.

There has been a slight readjustment but it certainly cannot be called a recession. The statement that the planes are pulling business back to themselves is justly exaggerated.

"The other side," says a subcontractor, "and we will not be one of our prime contractors, who recently was granted by the military service a \$9.1 million expansion, that our company can expect the volume normally subcontracted to us to decrease to zero within the next six months. We have been running approximately \$34,000 per month with this price over the last three years."

The decision of the prime was not based on an efficiency in performance quality or price. The pressure on the prime to keep his government-owned facilities occupied prompted this decision.

"Since the start of the Korean war, direct small business participation in the total aircraft procurement program has been in the order of 10% of the total Air Force budget," says a USAF procurement officer.

"Our figure shows a large number of aircraft subcontracting firms have gone out of business in this area within the past year," says a Small Business Administration official in Los Angeles.

A plan that when we talk about economic crisis in the subcontracting level of the aircraft industry, crisis are not quickly the same language.

► **Specialists**, jobbers and subcontractors are not the problem of the subcontractor but, we must know about type of subcontracting in order to discuss.

The subcontracting groups might be broken down into three categories:

► **Highly specialized firms** having no other business, part of the aircraft industry, or other products of an aircraft industry.

► **Design certain design inherent in the air weapons system** contract contractors furnishing this type of product probably always will be handling it because aircraft manufacturers will use it to the expense of producing their items in their own plants. These firms, however, are facing economic difficulties of their own, not connected with the problem of subcontracting business in general.

► **Specialized subcontractors** such as foundation and heavy machine shops which might be placed in this group. Many of the manufacturers in this group do not fall within the aircraft definition of small business since they have more than 100 employees.

► **Less specialized subcontractors**, such as job shops, turn-out and sheet metal shops, which are frequently in the aircraft industry.

The group in level A is short people in which prime contractors do work as

Aircraft Work reported in the first of this series on Air Force contracts in the small dollar volume of business available to subcontractors as a result of the outbreak and shutdown of the defense program (*Airweek* Work Sept. 27, p. 10).

As the work itself has been doing the effects of this economic adjustment on the subcontracting and component levels of the aircraft industry, falling in some of subcontractors, government officials Air Force procurement officers, Aircraft Industries Assn. officials, contractors and others.

The accompanying article in the second of a frequent series appearing in this column shows the results of this economic problem.

When one drops instead of subcontracting it.

There can be no question that the volume of subcontracting has been reduced by a large amount. But percent agreement, the figures are not as alarming as they are when considered in dollar volume.

In fiscal 1951, there was \$5 billion less available to subcontractors from the major airplane plants than in 1950. But the airplane plants subcontracted only about 10% less of the dollar volume received by them than they did the previous year. This 10% represents the size of the so-called "in-bid" by the airplane plants, not the dollar figure.

It is the reduction in dollar volume that is causing the difficulty.

► **Competition**—In pointing out that the problem of small business stems from the industry is dollar volume, not the reduction in dollar volume that is causing the difficulty.

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relation to strengthen the position of the subcontractors in the industry's manufacturing program.

A small group has decided that in dealing with the government and with prime manufacturers, strength lies in numbers.

Two separate organizations of subcontractors have sprung up on the West Coast out of this "smaller we stand, stronger we fall" thinking. One is the Small Defense Industries Assn.; the other is the Aircraft Subcontractors Assn. (There is a group will be discussed in detail later).

► **Trade Secretariat**—The position of Hydro-Air, which subcontractors such as contractors in fuel pumps and a design of the aircraft, is the authority of further study. With approximately 1,000 employees and a yearly volume between \$15 million and \$16 million, it is a typical specialist.

President Kohn has decided to keep Hydro-Air, a subsidiary of Aircraft Industries Assn., out of the two new organizations of subcontractors. Many of the large equipment and aircraft manufacturers have no subcontractors.

Many of the manufacturers carrying the burden of their own research and development efforts, are somewhat different than those of subcontractors who do it for or on contracting of their own.

► **Subcontractors**—The industry's problems resulting from the industry's price competition in the field.

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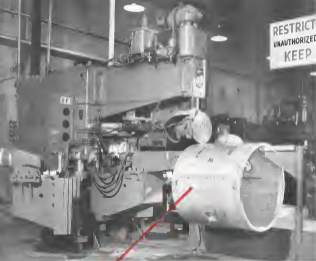
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## Northrop F-89-D Scorpion Fuel Pods Almost Entirely Resistance Welded

The Aircraft Division of Day & Night Mfg. Co., Monrovia, California, manufactures the fuel pod for the Northrop F-89-D Scorpion, and took advantage of all the possibilities of resistance welding. As much as 95% of the hardware in the fabrication of nonpressure parts of the fuel pod is done with Blensky spot and seam welding.

Day & Night technique of fabrication reveals some interesting examples of simplicity and efficiency. The fuel pod normally has resistance does not use the classic joints of parallel seam welds which often cause at night repairs. Instead a seam weld following the shape of the opening has been adopted. You can read the details of this and other interesting items of Day & Night resistance welding by looking for "Resistance Welding at Work," Vol. 3.—See 6 Day & Night resistance welding of the Scorpion's fuel pods is another fine example of Blensky basic thinking — welded designed to do more useful work at lowest operating cost with maximum reliability.



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JET-POWERED HORNET flies on Hiller flight line in other copter before overhaul.



COPTER FACTORY has expanded through programs set up by the military and Hiller.

## Hiller Ramjet Near CAA Approval

Copter would be first jet-powered U.S. aircraft to win certification, marking important milestone for firm.

Palo Alto, Calif.—Hiller Helicopters expects Civil Aeronautics Administration to certify its next Hiller Hornet by the end of this month, thus making it the first U.S. jet aircraft of any type to receive CAA certification.

Military services have ordered five of the aircraft for evaluation by the Army, Navy and Marine. Army designation is H-12. Navy designation for the five-place, tip-powered helicopter is H-12E.

CAA Type-Certification and parallel final CAA flight testing. Final 1970, as on the engine was begun early in September of this year. Such tests in static and fatigue loads

testing, structural engine testing, and full scale static testing already have been completed.

Hiller's military contract calls for CAA certification of the Hornet before delivery of the evaluation aircraft to the services.

"The certification program has gone reasonably smoothly considering that this also is the first program of this type for the Civil Aeronautics Administration," says a company official. "CAA cooperation has been wonderful."

The H-12 is a greatly modified version of the Hornet, which made its first flight in 1970. Company pilots

report its flight characteristics are excellent. No performance figures have been released, but the new Hornet has reached an altitude of 8,100 ft on its test flights.

► **Important Milestone**—Successful certification of the nation's first jet aircraft will mark another important milestone for the company, which ranks third in the helicopter industry in total sales.

Recent rumors that the company is in shaky financial condition and about to be sold are denied by top company officials. One of the most recent tales is with Douglas Aircraft Co.

"Our position financially speaking is getting better all the time," says senior vice president A. J. M. Chabouk, who heads the Contracts and Sales Division. "Our business has been expanded by the military and by privately."

"Obviously the question of merging is going to be talked about from time to time but we don't see the helicopter field as being to stay. There will be more talk about what we are going to do. What we are doing is looking the field over to see whether such a step would be worthwhile from our viewpoint."

"Whether we merge or not, or whether we take other companies under our wing is in the future. We are not intending to be controlled unless it is to our advantage."

► **Sales and Profits**—The firm's net income last year alone totals was \$347,037 despite a heavy outlay of research and development costs resulting from the Hornet program.

Commercial sales now make up about 25% of Hiller's total business, and company officials say the commercial market is expanding rapidly.

In addition to its jet program, the pioneer helicopter firm is producing H-23s for the Army and its civilian counterpart, the Hiller H-23. Navy version is the H-23E.

It also is testing out spare parts for the H-23 and overhauling that aircraft under the first Air Force BLAN (blanket and repair as necessary) contract for helicopters.

Another Hiller program covers maintenance overhaul.

► **Conversion**—Blensky—Hiller is carrying out three major studies for the Air Force and Navy, one of which is concerned with a conversion program.

"We are following the conversion field closely," Chabouk says. "We think that it is in our aspect of the helicopter field that will take up a large part of the market."

Company officials decline to talk about the details of their ongoing work on the conversion.

► **Commercial Plans**—There are no final plans for commercial production of the jet-powered Hornet, although one possi-

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New series of the light, compact A.R.C. Type 016784 (non-magnetic) provides equipment can display a course point indicator that performs the work of two instruments used. The course-point indicator and the course indicator have been combined into one unit that fits a standard 1 1/2" and mount hole. This saving in instrument panel space is important, particularly now that dual VOR installations are in progress. In addition to the space saving, installation costs are not. Ask your dealer to specify the new Aircraft Radio Corporation as part of your 150 instrument-related equipment deal. The indicator may be purchased separately for use with other Types C and D instruments. Write for complete data.

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- Standard Wave



600 Hz Receiver with 1/2 inch diameter & 1/2 inch hole, 1/2 inch hole & 1/2 inch hole



1/2 inch diameter & 1/2 inch hole



HELICOPTER H-33B takes off on flight checks near Golden Gate before delivery to the Army.



TAIL BOOMERS for H-33B are fabricated on assembly line at Hiller's helicopter plant.



TWO-PLACE COCKPIT for H-33B is prepared for installation into test assembly line.

dent A. W. B. Vincent, head of commercial unit, says there might be some available next year.

Commercial output depends on the military evaluation of the new helicopter.

"Without a military order, it is doubtful we can have commercial production."

The market for such a short-range helicopter would be limited, Vincent says, but its simplicity and high lift capability make it useful for agricultural work.

"We definitely will follow up the top engine field," adds Chaswell. "Not exclusively—we'll follow other develop-

ments. But for a number of types of helicopters that is where we feel the power should be applied, whether it is generated there or not. While the present use of the H-33B may be limited, it has opened new fields."

Hiller H-33B has 15-52 has 240 cubic inches driven by small reciprocating engines located at the blade tips. Empty weight is 550 lb. It can lift more than its own weight.

Test flights of the H-33B began late in 1973.

Reciprocating engines were chosen for the H-33B due to their simplicity and more immediate availability, although Hiller engineers realized this would have

## A New Concept in Flight



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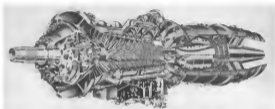
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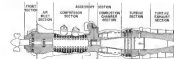
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# PRODUCTION ENGINEERING



**T34 CUTAWAY** reveals details of reduction gearing, 11-stage single-shaft compressor, 3-stage turbine. Rating is 5,500 shp.



**SECTIONAL BREAKDOWN** shows sequence of main rotor from engine (front) to rear.



**FRONT SECTION COMPONENTS** include propeller shaft and low-speed gear train.

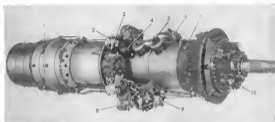
## First Details

Interest in turboprop-powered transport is at a new high in both military and commercial circles. One engine playing a basic role in turboprop development in this country is Pratt & Whitney Aircraft's 5,500-shp. T34 (*Airweek* March 20, p. 19).

The engine is the powerplant for one of the military's heavy-lift engine transport types. The Air Force officials are interested in the results of these installations because the results may be considered as being prototypes for one form of future transport development.

Since early this year Douglas Aircraft Co.'s C-124B has been flying with T34s for the Air Force. Early last month Lockheed Aircraft Corp.'s T34-powered Navy R7V-2 Super Constellation went aloft for its first flight. Boeing Aerospace Co.'s YC-17 is scheduled for its first flight with T34 engines late this year in a cargo-transporter role.

This detailed analysis of the T34 engine is the first peering look at the insides of any American-built turboprop



**EXTERNAL DETAILS** 1, thermocouple head; 2, engine mount bearing; 3, brake actuator; 4, ignition system; 5, oil bleed valve; 6, oil cool; 7, hot thermocouple; 8, pressure oil relief valve; 9, compressor control fuel line; 10, scavenging pump.

## Disclose P&WA's T34 Turboprop Makeup

powerplant. Here is a nose-to-tailpiece design study of the P&WA engine.

### Front Section

• **Front case.** Front end of the front case has a mounted flange supporting the propeller shaft thrust bearings. A lens on the case accommodates the oil transfer tube for connection to the oil transfer bearing.

A mounting pad is provided for a freestanding temperature detector. Five circular sensors in the front of the case house emergency magnetic control assemblies. A pad on the case bottom accommodates the front scavenging oil pump.

• **Propeller shaft.** Prop shaft, set with a No. 70 spline, supports a two-stage planetary reduction assembly. Low-speed reduction drive pinion cage is attached with the shaft, while the high-speed gear assembly is held on the rear of the prop shaft by the reduction gear bearing support.

Rear end of the shaft is supported by two steel-backed bearing housings inside the low-speed pinion cage. The shaft's rear body is supported by ball and roller thrust bearings.

Scavenging oil pump drive gear is bolted to the shaft just ahead of the low-speed pinion cage.

• **Low-speed gearing.** Propeller low-speed reduction ratio is 0.354:1. Gearing is of the spur planetary type. The low-speed reduction fixed gear is a spur ring with diagonal splines on its outside diameter. These mesh with splines cast into the rear of the front case.

Fixed gear is held in the front case by the temperature pinion using as the rear face of the gear. A low-speed drive gear, splined and locked to front end of the high-speed pinion cage, transmits power from the latter to the rear low-speed reduction drive pinion. Each pinion is supported by a pin and a pressure shaft and splines with both on the inside diameter of the fixed gear.

• **High-speed gearing.** Propeller high-

speed reduction ratio is 0.257:1. High-speed reduction fixed gear is a spur ring and bolted to the front of the compressor front bearing support. The high-speed drive gear is splined to a coupling bolted to the compressor shaft thrust coupling.

Teeth on the outside diameter of the drive gear mesh with five reduction drive pinions housed in the high-speed pinion cage. Each pinion is supported similarly to those in the low-speed reduction gearing.

• **Gear bearing support.** The reduction gear bearing support houses the gear roller bearing, temperature pinion and temperature fixed nozzle.

• **Prop shaft bearings.** Propeller shaft oil transfer bearing is mounted on the shaft in front of the scavenging pump drive gear. The oil transfer tube, carrying the bearing to the pressure oil inlet on the bottom of the fixed case, transmits engine pressure oil through the bearing into the cavity between the prop shaft and the shaft transfer housing.



## P&WA's T34 Provides the Horsepower



PBHNS TC-171, shown in artist's conception, is scheduled to fly this year



DOUGLAS AIRCRAFT TC-124B just completed its service with USN.



LOCKHEED R1V2 Super Constellation the Navy made first flight last month

From there it travels through drilled passages in the high and low-speed piston cages to the reduction drive piston assembly.

The thrust bearing consists of a roller seat and a ball bearing that has a split outer race. Ball bearing outer race fits on the front outer race and the rear half of the split outer race seats against a shoulder on the prop shaft. Thrust bearing outer race retains the roller bearing outer race and the thrust bearing retainer the inner race. The nut carries two oil seal rings containing the inner in the bearing cover.

An oil flange is held between the thrust bearing and the front face of the roller bearing outer race. The bearing supports the front of the prop shaft and transmits thrust from the shaft to the engine mounting bracket.

• **Viscometer system.** At the reduction drive fixed gear moves inward as the diagonal spline of its outside diameter in response to the torque applied to the prop shaft by the compressor rotor shaft through the reduction drive gear, the reduced thrust of the fixed gear is counterbalanced by pressure of oil acting on the gear through the viscometer piston.

The piston carries two oil seal rings. A shoulder on the forward outside diameter of the piston maintains contact with the fixed gear rear face. Engines all have the pressure of pump oil acted through its external oil transfer tube and a curved passage in the viscometer oil inlet connection on the lower right rear of the reduction gear bearing support.

From the oil inlet connection, oil passes through the viscometer valve to the rear of the piston. The valve maintains integrity of oil pressure.

Pressure oil is received by the piston, which opens or closes the valve by its

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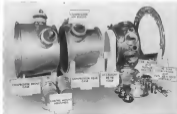
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A sphygmometer of blood outside on the upper rear side of the bearing support branch off are exact pressure. Thus, the reduction does lead over always.

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Conversion is easy from the standard 5/16" shielding threaded type. Most cases require only the replacement of elbows and lead connectors.

Champion R115 All-Weather Spark Plugs may now be obtained through your regular Champion Aviation distributor or by ordering direct from the Champion Spark Plug Company, Toledo 1, Ohio.

### SPECIFICATIONS

5/16" 30 Shielding Thread	Installed Height 3 1/4"
Thread size 18mm	Integral Resistor
Thread length 1 1/2"	Gap setting .012"-.016"
Max Size 1/4"	

Over 200,000 hours of successful operation



FRONT DETAILS: 1, prop shaft front plug; 2, torquemeter transducer adaptor; 3, torque pump; 4, shaft oil transfer bearing tube; 5, emergency negative torque control rod; 6, shaft T. bearing nut.

torquemeter pinion, the compressor is for rpm and a pressure differential torque constant; the pilot can determine the horsepower being delivered to the propeller.

### Compressor Section

An inlet case, six hollow struts in the air inlet case connect the case center with the hub. Compressor discharge air circulates through the four upper struts to provide engine cooling. Three of these struts contain butterfly passages. The two bottom struts are used as oil passages, one carrying gas from the front case and torque meter while oil from the fuel scavenging oil pump is carried to the other.

Means for mounting location pad and shaft being an outlet pad covers, three complex and optional instruments are located on the case's outside perimeter.

Compressor front bearing support together with the high speed reduction drive final gear, is bolted to the inside of the case behind the hollow struts.

Front bearing support now. Compressor front roller bearing is contained in a liner in the support case hub. The hollow inlet guide vane (10) are up



REAR DETAILS: 1, torque exhaust strut; 2, hollow discharge pressure hose; 3, torque pump; 4, case; 5, case.

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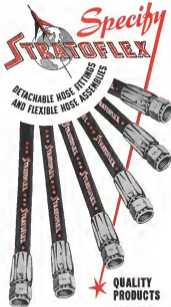
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### T34 Turboprop Specifications

Number of burner tubes.....5  
Compressor stages.....15  
Turbine speed.....3  
Compressor ratio.....65.7:1  
Propeller reduction ratio.....150:1  
Low.....8194.1  
High.....8257.1  
Propeller shaft output.....SAR No. 70  
Number of engine mounting bolts.....4  
Dry weight of engine.....2,564 lb.  
Maximum diameter.....34.06 in.  
Maximum length.....157.7 in.  
Approximate cruise at 5000 ft.

Forward of rear face of accessory  
case no. 100-1000 shaft output  
line.....31.3 in.

YT4F-1 has emergency engine  
thrust control valve actuator  
controlling 3 in. bypass fuel air  
control unit for use with Curtiss  
propeller. Engine includes 2 pole output  
line type ignition system.

YT4F-2 has emergency engine  
thrust control actuator 3 in.  
bypass fuel air control unit for use with Hamilton  
standard propeller. This engine has  
4 pole output type ignition system.

YT4F-12A is similar to the -12 on  
page, except that it has one piece motor  
and water combustion chamber lower  
and fuel control adapted for T34 fuel,  
cruise at 100/130 fuel

ported between an inner and outer  
shell, the former bolted to the rear  
of the support case hub.

Four passages in the support case take  
air from the lower the guide vane to  
the air inlet duct.

Located in the front of the valve  
bearing housing is a tube for transfer of  
pressure of from a bellows passage in the  
support case to a passage in the lower. A  
plug in the lower inside shoulder pattern  
a fuel oil spray in the rear of the valve  
bearing housing.

Oil is prevented from entering the  
air system by a corking seal in the rear  
of the lower bearing housing.

Compressor assembly. The 15-stage  
compressor is housed in a front case  
and a rear case. The rear case usually  
consists of the 13 axial disks, 15 spacers,  
a front shaft and a rear shaft. Main  
shaft and disk and disk assemblies are  
located between the compressor rotor  
stages, and the rear shaft drives a  
rotary ring for the two air seals on the  
outside diameter of each spacer. Outer  
seal shafts are fitted with disks in  
spacer assemblies.

Compressor front shaft is supported by  
a roller bearing in the front bear-



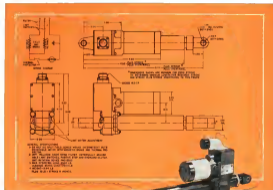
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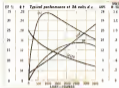




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INVERSEX negative torque control system shown in schematic layout.

ing support from. Two ball bearings support the rotor near shaft and are mounted in the bearing support in the accessory case, with an oil and separating the bearing load from the compressor air system.

• Compressor casing. Compressor front and rear cases bolted together form a wet bearing at the front end to the air inlet case and at the rear to the accessory case. Located on the upper rear of the front case are two air bleed valves for taking air from the sixth stage and bleeding it overboard.

Two bleed valves located on the upper front of the rear case permit bleeding of seventh stage air overboard. Between the two front air bleed ports is a reversing port for bleed valve manual location.

• Accessory case. This case is mounted at the forward end to the compressor case and at the rear to the combustion chamber rear case. It houses the two main compressor shaft roller bearings and their associated. Main and normal oil sprays the front face of the front roller bearing, and oil from a groove in the center of the bearing line lubricates the front and rear bearing working faces and the rear bearing.

Accessory drives are driven by the compressor main hub accessory drive gear. Bolted to the accessory case are thrust support flanges for generator and thrust pump drive and flanges for starter drive and the main compressor drive housing. Flanges are provided for servicing air, thermocouples and pressure probes. Right after burner at the rear outer diameter of the case accommodates fuel nozzle and support assemblies.

## Combustion Section

• Flared, stainless. Flared ring is inserted between the accessory case and combustion chamber rear case. It supports the primary and secondary fuel manifolds normally on its forward face. This assembly consists of upper and lower primary and secondary manifolds.

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## SNUBBING WINGFOLD

The diagram illustrates a hydraulic system for a wing fold cylinder. It includes a 'WING FOLD CYLINDER', a 'SNUBBING VALVE', a 'CHOICE' valve, a 'PRESSURE' valve, a 'SELECTOR VALVE', and a 'ONE WAY RESTRICTOR'. A line is labeled 'LINKAGE MOVES WITH WING'. The system shows how pressure is applied to the cylinder and how the snubbing valve controls the flow to prevent shock.

## Adaptability of new Parker valve helps simplify hydraulic-system design

"Many hydraulic-system designs can now be simplified by using Parker's new line of three-plate valves. One basic valve can easily be adapted for landing gear, bomb-bay doors, flaring doors, or wing folding," reports H. C. Trich, shown at left describing a wing-fold application. He is Staff Engineer—Hydraulic Systems, at Parker Aircraft Co.

"Parker's three-plate valves are also interesting to designers," he continues, "because they can provide the best snubbing available. This snubbing is the result of moving at each end of the plate travel . . . made possible by the non-deep shape of the ports."

"These valves all have laboratory low leakage because of the metal-to-metal seal between the

plates. The plate surfaces are optically flat within two light bands. Because there is never any separation of the plates, contamination cannot get between the surfaces to cause leaks. There is also no uncontrolled interface between the ports.

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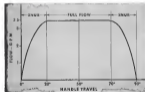
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AIR INLET CASE and high-speed induction gas components of T34 turbo-prop.

tubes and eight fuel manifold connections.

Two tubes connect each fuel manifold recessive with the corresponding fuel nozzle cover. The two bottom case sections also are attached to the primary and secondary fuel lines from the fuel distributing and dump valve.

• **Combustion chamber.** The two-piece combustion chamber outer case is secured to the secondary case at the forward end and to the turbine intermediate case at the rear end. The case contains eight radially located combustion chambers interconnected by welded projections. Forward face of each chamber is supported by the corresponding fuel nozzle. Gelcoats for spark ignition are applied to two of the chambers.

The chambers are supported at the rear end by inner and outer bearing bases. The chambers and bases are secured together and held in the combustion chamber support with a lock-pin. A fuel drain valve is positioned at the bottom of the combustion chamber outer case.

## Turbine Section

• **Turbine rotor assembly.** This assembly consists of the turbine shaft, thrust-stage turbine and rotor hub. Thrust disks and spacers together with the hub are secured to the turbine shaft with a screw. Turbine buckets are fit-trued to the disks and secured by pins. Turbine shaft is secured at the front end to the compressor shaft with coupling with bolts and supported at the aft end by the turbine rotor bearing.

Two air seals are inserted to each rotor disk and of the turbine nozzle assemblies. Dual air seals separate the rotor nozzle shrouds to form sealing rings with the turbine rotor buckets.

• **Turbine intermediate case.** This case

is secured at its forward end to the combustion chamber outer case and at the aft end to the turbine outer case. It houses the first stage nozzle case and shroud assemblies and the turbine front pin and bearing.

Bosses are provided on the rear of the case for thermocouple probes. Air holes on the front of the case introduce cooling air between the intermediate and turbine rotor case and the turbine case water heat divider.

• **Turbine outer case.** Secured to the intermediate case on the forward end and to the turbine exhaust case at the rear end, the outer case contains the turbine bearing support and feed struts. The latter are positioned around the bearing support housing struts installed over the support rods and the six turbo-strut rotor support tubes. Top and bottom, diametrically opposed, struts serve, respectively, as the rear bearing's bracket tube and oil drain tube. The bearing oil passage tube is inside the drain tube.

Secured to the front of the bearing supports are the rear shaft pin and the exhaust endogase bottle. At the rear of the supports are the rear oil seal cover and the exhaust duct support. In the center lower of the support is the rear bearing and housing, containing the bearing water nut.

The carbon seal housing is spring-loaded to provide constant pressure on the seal and labyrinth. The turbine bearing seal is sealed from the air system by the carbon seal and rear oil and bearing cover.

Sensors for thermocouple and pressure probes are provided on the outside of the turbine outer case.

• **Exhaust outer case.** This is secured at its forward end to the turbine outer case and houses the turbine exhaust duct inner and outer extensions. Two thermocouple bosses are located on the

rear of the exhaust case at diametrically opposed positions.

## Systems

• **Air bleed.** Compressor air bleed system helps starting and ensures compressor stability at low power conditions through four tubes at the seals and various stages of compression. These valves bleed air overboard during the engine starting cycle and during all operations below flight idle.

The system consists primarily of an air bleed control, a control governor and two float and two air valves. The control and valves are mounted on the top surface of the float and air compressor cases. The governor, located on the bottom of the secondary case and driven at 3,578 engine speed, is a centrifugal type rack transmitting motion to a shaft upon which are attached two valve bolts for selecting or permitting the flow of air passed from the bleed control.

The bleed control is composed of a housing containing five pinions and six connecting tubes to the governor and the bleed valves. Air flows like each and overboard stage of compression is transmitted to aspirate compressors within the housing, controlling the pressure at one end of each piston.

From here, the air flows through passages past small sleeves into compartments at opposite ends of the piston. The air then flows through exhaust tubes to the governor.

When the governor operates below 3,000 rpm, the air pressure overboard. When it operates at more of 3,000 rpm, it restricts air flow. Pressure builds up on the piston as the bleed control so that the opening spring force is overcome and the piston moves to a position permitting each overboard stage air to pass through an exhaust tube to its respective bleed valve. Air entering the valve forces the piston closed, thus preventing any further bleed from the compressor.

• **Anti-icing system.** High pressure compressor discharge air taken from the leading edge of the secondary case is piped forward through a regulator and an air valve to a well located in the air inlet case at the grade race location.

From this well the air passes inward through the cones into a space formed by inside diameter of cone inner shroud and rear outside diameter of compressor float housing support.

From this chamber the air is forced forward through four passages to the support into the four upper air inlet struts. The two lower struts are not subject to icing, since air circulates through them during engine operation. The air flow is discharged into the slipstream through ports at the outer ends



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of the four stroke an upper piston.

A regulator automatically controls the flow of oil—may act with changing temperature. A beneficial result is a valve operates at increased temperature to move the valve toward the closed position and restricts the flow of oil through the variable.

At 500° the shift in the valve may be designed to allow a maximum of air to pass. As the air temperature increases, the oil restricts the valve—closing the flat openings to decrease shift, at 500°, the shift is so positioned to allow only a maximum of air—passing air to pass.

• **Engine leaks.** Mounted in conjunction with the starter drive gearing, a leak is used to prevent noise and possible vibration with an emergency engine whether the aircraft is in flight or parked.

The leak is designed to provide enough drive torque to maintain the varying input torque that occurs when a propeller is feathered at different air speeds.

Red input torque of an unfeathered prop blade is far too great for the blades to overcome. Therefore when the blades are used during flight to stop rotation of an unresponsive engine, the propeller is feathered before and in long as the blades are applied. To help stop engine rotation after feathering in the ground, the brake may be applied at any speed below 5,000 rpm engine speed.

• **Lubrication system.** A single section pressure oil pump furnishes oil to the propeller shaft bearing, reduction gear, mainshaft, inboard and outboard bearing locations through fuel orifices, thus providing a constant flow of oil at all engine operating speeds.

The temperature oil system is a low pressure type oil moving a liquid pump but allowing high pressure oil directly from the engine pressure oil pump.

A three-section scavenger pump is arranged to collect proper scavenging oil at points where oil is collected. The vent lines from the various oil collect within the engine are connected to one of three, or all, transfer scavenging valves located on the upper half of the air inlet case.

• **Fuel system.** Demonstration of the fuel flow schedule for a propeller turbine engine is approached two run cycles to that of obtaining a suitable fuel flow schedule for a reciprocating engine. Landing turbine fuel temperature or compressor surge might be compared with detonation limits of a reciprocating engine.

From plots of fuel flow and power at various engine types (could be a governing propeller), data is obtained as to the most desirable range of engine speed versus power to obtain the best possible combination of specific fuel

consumption, engine durability, propeller performance and control facilities.

The optimum air at any given power in the light opening range is obtained by power calibration of the engine. The fuel control linkage is arranged so that the power lever movement is coordinated with propeller governor setting to achieve coordinated power control.

• **Liquidation system.** A high capacity capacitor ignitor system is used. This provides a spark capable of burning carbon deposits and vapors of hydrocarbons of fuel.

The high capacity ignitor makes possible starts with carbon fouled spark plugs, also facilitates air starts at high altitude.

• **Throttle control.** To prevent excessive synchronous thrust on the result and to provide for automatic reduction of windmilling drag to a solenoid valve in the event of power loss, the engine is equipped with a device to provide a positive mechanical signal if negative torque at the prop shaft exceeds a certain selected value.

Forward motion of the reflector ring gear provides the lever to activate an emergency negative torque control (ENTC). A slight movement is enough to give a positive signal. When the shaft has moved forward this distance, the ENTC signal is given and the propeller mechanism starts turning the blades toward the feathered position.

If at any time the negative thrust is reduced from the feathered take, springs overcome the forward movement of the ring gear and return it to its position. In this way, if the ENTC signal ceases, the prop pitch control is returned to the governing system.

—Living Stone

## Prizes Spur Study Of Fuel Systems

An incentive award for engineering students to study basic considerations in the design of improved fuel systems in aircraft at similar has been announced by William H. Calman, president of Aero Supply Manufacturing Co.

The Aero-Supply Research Award will give a first prize of \$3,000, second of \$500, third of \$300 and two consolation prizes of \$100 each. Judging will be done by a committee of personnel, but representing a cross-section of the manufacturing industry and engineering schools.

Calman said that his firm is "an intensive search of the need for improved basic research consideration to the nation's aircraft development." There is still a serious shortcoming in the state of research. It is our hope that this competition will help overcome that shortcoming.

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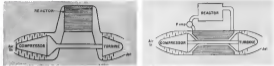
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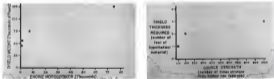
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WHETHER ATOMIC REACTOR is ducted-type, air-cooled type (A), or air-cooled, liquid-cooled (B), plane will be heavyweight.



HEAVY AND THICK SHIELDING will be needed to protect personnel against high radiation levels that will accompany high horsepower.

## Why Atom-Powered Planes Will Be Heavyweights

How big would an atom-powered airplane be?

Something on the order of 200,000 lb gross weight and requiring about a 10,000-hp, powerplant, says Kenneth Kinschke, manager of Atomic Energy Dept., American Locomotive Co. (August 1958 Sept. 17, p. 7).

In a talk before the Metropolitan Section of the Society of Automotive Engineers, Kinschke presented some "broad-brush" figures and estimated figures for weight and horsepower of atomic aircraft. Although "grossly oversimplified," he said, "the results are at least in the right ball park. These chief values, however, lie in the fact that they demonstrate quite clearly that the current state of the art restricts atomic powerplants to the larger size vehicles."

Traditional observers compared Kinschke's estimates to the jet and power of the current C-54 and C-54 series, grossing about 60,000 lb and with installed horsepower varying between about 7,000 hp for takeoff and about 40,000 hp for maximum speed flight.

► **Reactor Size.**—Kinschke said that the largest size for atomic reactor is about five ft in diameter. For high atomic flight speeds, heat must be dissipated in that surface at a rate of about 100,000 hp in order to produce the 20,000 hp

or more required to propel a plane. Radiation from such a reactor is about two to three percent of the power, or about 2,500 hp. This figure is about a million times lower than the acceptable current level of radiation for health operating standards.

Deterring factor is a favorable way, Kinschke pointed out. At a distance of 17 or 20 ft, the radiation level is only about 1/1,000 of the level at the reactor. Such a restrictive still leaves a field that is a billion times too strong for the human anatomy.

► **Shielding.**—Hydrogen is the only substance that makes shielding of the reactor a necessary evil. Fortunately, says Kinschke, shielding thickness is not proportional to the strength of the radiation source, but to its logarithm.

As an example, he cites a reactor which is 100 times too strong for a human to tolerate, and shields it with two feet of some material. If the source is increased to 1,000 times the human tolerance level, the thickness of the shielding only increases to three feet.

Applying this to a practical consideration of the shielding required around an aircraft powerplant, Kinschke says, "since a double shield is used to stop gamma radiation and water to stop the neutrons. For a 75-hp powerplant, the shield weight would be 44,000 lb, and



100,000-hp engine with 50,000-hp atomic engine would be only attenuates infinite

that, for instance, why there won't be an atom-powered lightplane.

An increase of 1,000 times in the horsepower—to a level of 75,000—results in a shield weight which is increased at 751,000 lb.

► **Asplastic.**—Francis Kinschke stresses that the shield weight is equal to the fuel weight carried in some large airplanes, in airplanes that means that the engine required to work with the reactor would not be appreciably heavier or lighter per horsepower than conventional engines. Assuming also that fuel weight equals one-half the gross weight of the airplane for large craft, he says that the gross weight is twice the shielding weight.

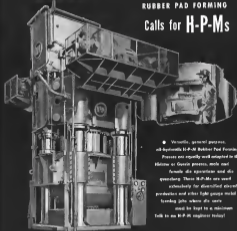
Based on these crude assumptions, Kinschke estimated the plane would "approximate B-36 weight," which is roughly a power-loading ratio. The is

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## A black and white photograph of a B-2 Spirit bomber flying over a city. The bomber is in the foreground, angled upwards and to the right. In the background, a large, stylized graphic of a city skyline is visible, featuring a prominent building with a flag on top. The sky is filled with clouds.

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program can be interrupted whenever necessary to permit a wide variety of special orders to be executed into the program either by the machine operator or by external device.

• **Diverse Characteristics**—Like Sata, the new machine operates at a base repetition rate of 1 sec., operates in the binary system, reads numbers using a 45-digit (including sign) word length. Other machine characteristics:

• **Instruction system**—Three address system, which puts the location of two numbers to be operated upon, and tells where the result is to be stored.

• **Internal memory**—Automatic delay lines, giving maximum capacity of 512 words, with maximum access time of 354 microseconds. By adding more than six sets of storage, 4,096 words capacity can be achieved. Machine provides for automatic parity-check of storage accuracy.

• **Machine Performance**—Flow rate performance rates which NBS gives for the new computer:

• **Addition-subtraction**—0.9 million words

• **Multiplication-division**—3.0 million words

• **Comparison**—0.7 million words

• **Standardized Circuits**—Is designing the new machine, NBS was able to reduce the number of logic circuits to only two types, which with minor modifications, are used throughout. These two basic circuits are built on etched-circuit plug-in packages.



## Navigation Package

Eight-plus VOR "duplicators," announced by Nemo, consists of Simulators (12-channels), VLF communication set and an emergency navigation receiver. New VOR adapter, which plugs into existing equipment on the Simulators, weighs 2.75 lb., costs \$195. Outageproof provides conventional left-right course indicators, which also serves as "to/away" indicator at the top of a needle. Adapter—National Aeronautics Radio Corp., Austin, Tex.

The computer itself employs 574 tubes and 71,000 germanium diodes. Another 560 tubes and 3,100 diodes are used in the internal memory of the machine.

Four three-ton air conditioning units are installed in the trailer van to drive computer heat.

—Philip Klein

## Expansions Reported For Avionics Industry

Contract for unannounced plans to construct a \$100,000 building at San Diego for electronic computer research, one of several recently disclosed avionics industry expansions. The new \$200 sq. ft. Computer building, slated for completion early in 1975, will add to the company's new engineering building.

Other recent avionics industry actions include:

• **American Gryo Corp.**, Santa Monica, has moved to new, enlarged quarters at 3014 Nicholson Ave. The new three-story building occupies 20,000 sq. ft. of factory and office space.

• **Beck Electronics Co.**, division of Clevite Corp., has purchased the assets of the Digital Instrument Co., Coral Gables, Fla., manufacturer of electronic counters. Mead C. Beem, former president of the Florida firm, will serve as manager of Beck's digital instrument department, with headquarters at 3485 Polaris Ave., Cleveland, Ohio.

• **Radio Receiver Co., Inc.**, New York, has changed the name of its Selection & Germanium division to the "Scrambletron division," better to identify its expanded range of products.

• **Cook Electric Co.'s** electronic systems division has moved to a larger plant at 2191 N. Ashland Ave., Chicago, which doubles present working area.

## Makers Report New Magnetic Amplifiers

Two new high performance, 440-cycle push-pull magnetic amplifiers for aircraft proportional valves or servo motors that require three to 10 watts are among recently announced devices available for servo control use.

One of the new new amplifiers Model XPC-57A is a tubeless transistors-Borewick's Associates. This device, rated at three watts, weighs eight oz and occupies 10 cu in. The other Model XPC-64B, rated at 30 watts, weighs two lb and occupies a volume of 40 cu in.

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Other new servo-system components recently announced:

• **Mechanical magnetic chutes and boxes** with magnetic base of six mils. seconds, are available in three types: single chute, double chute and clutch brake. Units are designed for maximum torque of 15 oz.-in. and for input that drive speeds to 1,000 rpm through operating temperature range of -57° to 157° F. Moment of inertia of input shaft is 0.30 oz.-in.<sup>2</sup>, for output shaft, 0.21 oz.-in.<sup>2</sup>. Single clutch weighs 0.15 lb., double clutch weighs 1.5 lb., and clutch brake weighs 2.2 lb. Manufacturer is Ford Instrument Co., 5118 Thomson Ave., Long Island City 1, N.Y.

• **Frequency detector**, Type FC-15 A, designed to provide an output whose frequency is equal to the modulation frequency plus or minus the speed of the input shaft. The new unit 15 frequency detector is designed for a primary or reference of 10 v., 1,000 to 5,000 cps, with a 1.5 transducer ratio between primary and secondary readings. With primary operation of 2,000 cps, and a shaft speed of 100 rpm, center response is greater than 36 db, according to manufacturer. Clifton Products Co., Inc., Maple at Broadway, Clifton Heights, Pa.

• **Pen-type servo components**, including motor and transducer, are available as prebuilt from the Korlett Co. Typical servo motor, measuring 3 in. dia. x 4 in. long, has no load speed of 5,500 rpm, stall torque of 0.1 oz.-in., weighs 1.2 oz. Power and torque transducer, control transducer and drive clutch, weighing 1.75 oz., have zero mean error limit of 30 min. of arc, company says. Korlett Co., Inc., 1575 Main Ave., Clifton, N.J.

• **Magnetic amplifier**, Type R6C1B1, for 60 cycle a.c. delivers 30 watts reversible phase output with reversible phase or reversible polarity d.c. output. For more information, write to Polytechnic Research & Development Co., Inc., 202 Tillary St., Roslindale 1, N.Y.



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## STEREO FILTER CENTER 22222

• DME Looking Up—Civil DME's chance for co-existence with the military. These systems are looking up, according to elements close to the Vortec committee, set up to resolve the controversy.

• Transistor Handles 5 Amps—New germanium p-n-p transistors capable of handling up to 5 amp. collector current has been developed by Minnesota-Norcross. New PNP silicon-p-n-p transistor, identified P-11, is expected to have a Class A power rating of 15 watts. Frequency response and gain are approximately the same as the linear powered, 2N57 transistor, 50 Hz response. Experimental quantities should be available within 90 days.

• New Twin-Input model of Lora's electronic circuit (transfer driver, magnetic circuit) will be used in a production guided missile, replacing previously used electronic circuit and receiving a record from its feedback. By using new technology, Lora has been able to load further the response of its last-order servo used in the P-5 autopilot on the F-402, P-502.

• Force-Min's GCA Receiving—Keith Laboratory for Electronics and Giffen Bros. report the sale of industrial quantities of their new low-cost GCA's, with considerable interest evidenced by state and local civil aviation groups (because of low expenditures, neither yet readily purchaseable). Giffen Bros. expects to demonstrate its first unit in October.

• New Pressure Ratio Indicator—Berens will equip its B-75 with a newly developed Minneapolis-Honeywell pressure ratio indicator, designed to give pilot a cockpit indication of engine thrust. Device will measure engine inlet and turbine pressure, present a visual indication of the ratio. Observer any device is particularly important for aircraft using two-speed engines where one measurement may be operating near stall conditions, and pilot measure of it.

• Aids Tell Tales—Aviation industry people find display aids in the trade press and newspapers give good leads as to what the competition is planning. For instance, recent ads for engineers in New York papers indicate that:

• Remington Corp., Boston machine manufacturer, plans to develop airborne control computers for heading, navigation, fire control, flight control, and automatic landing, and return-to-base systems, working its first high-order en-

try into the systems field. The ad also indicates further expansion of the ad-to release digital computers.

• Hughes Aircraft is developing general load and mobile radar and computer systems, a new field for the company.

• East Avionics is working digital computer systems, suggesting that the company plans to develop a universal type digital computer for its flight simulators which could be easily adapted to a wide range of aircraft types.

• Cause and Get Two—Tosco Instruments, first producer of high temperature silicon transistors, reports that production is currently running close to 500 per day and that it has imposed rather restrictive on customer quantities to individual purchasers. By end of the year, company expects to be making 1,000 silicon transistors a day.

• Talking VOR on Test—Melpar's plan error indicator—also called "talking VOR"—which gives an oral indication of angle bearing to a VOR station accurate to within 5.10 degrees, is undergoing test at GAA's Technical Development Evaluation Center in Indianapolis. A second unit will soon be installed for evaluation in a Wilson Electronics TVOR in Kansas City. Although the device is intended primarily as a rough check on VOR accuracy, it can provide navigation information to lightplanes equipped only with a VOR receiver.

• Auto Parts Research Lab—Avon, whose Cordley Division is heavily engaged in aviation, is reportedly setting up an aviation research lab in the Boston area to be headed by John M. Shultz, former technical director of the AF Cambridge Research Center.

• Carlson to Magnavox—Harry Carlson, chairman of the Defense Dept's Advisory Group on Reliability of Electronic Equipment (AGREE), is leaving to become general manager of Magnavox's Government Products division in Ft. Wayne, Ind. —PK

## Avionics Bulletins

New technical bulletins and booklets describing devices and techniques of interest to persons in the aviation field include:

- Shorter air data computers which can be used in many situations to provide a variety of basic data for data needed systems. 10 pp. • Documentation 200, Westburg 2, 1, 3, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, 1090, 1100, 1110, 1120, 1130, 1140, 1150, 1160, 1170, 1180, 1190, 1200, 1210, 1220, 1230, 1240, 1250, 1260, 1270, 1280, 1290, 1300, 1310, 1320, 1330, 1340, 1350, 1360, 1370, 1380, 1390, 1400, 1410, 1420, 1430, 1440, 1450, 1460, 1470, 1480, 1490, 1500, 1510, 1520, 1530, 1540, 1550, 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- Description of the various types of aircraft systems, including: 1. Electrical systems, 2. Fuel systems, 3. Hydraulic systems, 4. Pneumatic systems, 5. Environmental systems, 6. Landing gear, 7. Landing gear, 8. Landing gear, 9. Landing gear, 10. Landing gear, 11. Landing gear, 12. Landing gear, 13. Landing gear, 14. Landing gear, 15. Landing gear, 16. Landing gear, 17. Landing gear, 18. Landing gear, 19. Landing gear, 20. Landing gear, 21. Landing gear, 22. Landing gear, 23. Landing gear, 24. Landing gear, 25. Landing gear, 26. Landing gear, 27. Landing gear, 28. Landing gear, 29. Landing gear, 30. Landing gear, 31. Landing gear, 32. Landing gear, 33. Landing gear, 34. Landing gear, 35. Landing gear, 36. Landing gear, 37. Landing gear, 38. Landing gear, 39. Landing gear, 40. Landing gear, 41. Landing gear, 42. Landing gear, 43. Landing gear, 44. Landing gear, 45. Landing gear, 46. Landing gear, 47. Landing gear, 48. Landing gear, 49. Landing gear, 50. Landing gear, 51. 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## Plane Sales Give NAL Record Net

Aircraft and equipment deals produce capital gains that push profit to peak despite operating cost rise.

An interesting forerunner of 1954 air transport results may be allowed by National Airlines' recently released report of record record profits. National and Delta-CAS are the only trunk airlines reporting on a fiscal year basis as of June 30. The official Delta-CAS report is not available as yet.

National's reported net profit of \$4,405,745, or \$4.62 per share, for the fiscal year ended June 30 set an all-time high in its history, comparing with \$3,934,465, or \$3.99 per share, in 1953.

■ **Sale Profits**—The bulk of the nation's profits for fiscal 1954 were realized from the sale of aircraft and other equipment. Actually, current operating earnings were lower than for the 1953 period. This is indicated by net profit from operations of \$1.6 million after provision for all taxes for fiscal 1954, compared with \$2.1 million for 1953 and \$1.5 million for 1952.

Capital gains from the sale of equipment aggregated nearly \$3.1 million after taxes for 1954 and represented some 69% of the year's total net earnings. Capital gains also were net income for 1953, amounting to \$2,363,090 after taxes.

■ **Low Taxes—Conservative** accounting in handling for items reduced National's 1954 reported net income to \$340,000, or 34 cents a share. NAL, for income tax purposes, is amortizing its new airplanes at 30% of cost over a five-year period in keeping with its certificates of necessity. However, a seven-year period is being used for amortization purposes in stockholder and other public reports.

This has resulted in the provision for income taxes for the year of \$4,936,500, substantially less than the net income before taxes would indicate. Accordingly, when the flight equipment has been amortized fully for tax purposes, the taxes will be larger than the net income before taxes will then indicate.

The provision of \$380,000, made by a charge against income for the year ended June 30, 1954, will be used to reduce the provision for income in some long in future years after the flight equipment has been amortized fully for tax purposes but not fully depreciated on the records.

Of course, this move may not be required for his purposes at some future time if, for example, further equity

must expenses by National require continuing high depreciation charges in subsequent years. In this respect, the move may be said to represent a surplus "cashflow."

In any event, the stockholders' equity is best served by providing for such for income until the contingency of a situation is no longer present.

■ **Lower—Expense—Lower** operating charges indicated by the company are in keeping with the industry's trend for this year. Significantly, along with the industry experience, National has encountered lower operating savings in the face of a new peak in new rates.

Operating revenues for fiscal 1954 were \$18.5 million, a new high and an increase of 19% over 1953's \$15.5 million. Passenger revenues accounted for \$14.5 million, or 78% of the total. The big increase was generated by air coach, with revenues from this source up 61% while first-class revenue declined 2%.

Narrowing profit margins resulted from the increase in the volume of coach traffic as the trend to reduce the overall unit cost per passenger mile to 1.08 cents in 1954 from 1.14 cents in 1953. Operating expenses reached \$15.8 million, up 23.6% from the previous year. The company attributes a substantial part of this increase to the operating costs of introducing its new DC-7s and Constellation 440s but considers "the rising cost of fuel" as the outstanding problem confronting the air transport industry.

■ **Higher Book Value—Considerable** improvement in NAL's financial position also has been achieved during the past fiscal year. Book value increased 28.6% to \$15.15 per share, or \$17.52 per share as of July 30, 1954, from \$14 million, or \$13.05 a year earlier. This year, on June 30, 1954, book value per share amounted to only \$6.10, revealing an almost threefold increase in the period.

Regular quarterly distributions of 15 cents per share were maintained throughout the fiscal 1954 period.

The re-equipment program during 1954 resulted in net cash expenditure of about \$20.5 million. After adjustment to disposition of older equipment (from which the material capital gains were realized), the net equipment acquisition resulted in increasing the net operating property amount to more

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The great success of the nation's domestic and international airlines last year established their best safety record in history, carrying 34 million passengers more than 20 billion passenger miles. This is positive proof that the most dangerous thing about flying is driving in the airport. For dependable standard aircraft parts or new designs for special applications call on Adel.



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Leach Corporation's experience in research, engineering, manufacturing and service in electrical diagnostic and electro-mechanical equipment have constantly been and are still being expanded for more efficient operation, supporting production, thereby lowering costs to customers.

For this specialized and technical experience to work on your specific requirements, to secure the full performance capability built into all products.

For research, development and industrial efficiency and safety  
Leach has become the name that stands for specialized electrical equipment.

	<b>LEACH RELAY CO.</b> Division of Leach CORPORATION Relays — Solenoids — Amplified Systems — A series Switches
	<b>PALM ELECTRIC APPL. CO.</b> Subsidiary of Leach CORPORATION 4627 Van Arman, Van, California 20-40-400 Cycle Alternators — Load motor Motors — DC Generators
	<b>ISET</b> Division of Leach CORPORATION 4441 Santa Fe Ave., Los Angeles 16, Calif. Power Supplies — Rectifiers — Magnetics Amplifier Circuits
	<b>JEFFRIES TRANSFORMER CO.</b> Subsidiary of Leach CORPORATION 1119 East 29th St., Los Angeles 16, Calif. Transformer — Windings — Rectifiers — Test Cells

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## Leach CORPORATION

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(over \$261 million, compared with \$173.5 million June 30).

The new equipment acquisition program resulted in a sharp reduction of working capital to \$192,215 as of June 30, 1964, compared with \$4,181,717 a year earlier. However, the most recent figure was after reduction of current requirements due on long-term debt. The next payment of \$546,000 is not due until Mar. 31, 1965.

Moreover, management reports that depreciation provides about \$190,000 in cash receipts. (The importance of stable cash generation from depreciation was indicated in American Wire Aug. 30 p. 13.)

• **Redwood Debt-Rail.** Debt was reduced to \$9,816,000 June 30 from its October peak of \$12 million. A final payment of \$514,000, scheduled for June 30, 1965, is slated to extinguish the long-term debt.

The increase in the net worth position and the reduction in bank loans has moved to bring the wire's debt ratio down to 15.5% on June 30, as compared with 35.5% Dec. 31, 1952—its highest point.

National completed its new equipment acquisition program. This was represented by the four DC's and eight Corvair 140s. In August 1964, two other 140s was purchased and added to the fleet. The new equipment, plus new hauler and dump trucks acquired under long-term lease in New York and Maine, are expected by management to reduce expenses and reduce costs. —Sally Altschul

## Aviation Facilities Win Tax Writeoffs

The following firms have been named contributors for awards for aviation facilities for work in expanded facilities by the Office of Defense Mobilization.

**Red Telephone Laboratories, Inc.**—White Plains, N. Y. Research and development of electronic. \$203,000.

**United Aircraft Corp.**—Hartford, Conn. Development of aircraft components. \$175,540.

**Radio-Television, Inc.**—Waltham, Mass. Production and distribution of radio receivers. \$172,000.

**Standard Telephone Co.**—Hartford, Conn. Research and development of electronic components. \$170,000.

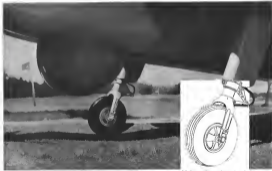
**Standard Telephone Co.**—Hartford, Conn. Research and development of electronic components. \$170,000.

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## Golf course fairway — Seawear runway



Whether on left or right, ground, and in grass, the Seawear can glide to its normally small size because of its low landing speed and long take-off thrust. The nose can be easily changed to suit terrain.

**Seawear** — a tough, economical, all-weather submarine kites. In adverse weather — submarine weather — the Seawear can be airborne after a short take-off from an emergency strip... can conduct a radar search and low-level attack... and can land back safely almost anywhere (even on a golf course!)—due to its slow approach speed and shock-resistant undercarriage.



The extremely good landing characteristics of the Seawear combined with simplicity of construction and slow return make it an excellent kite to fly, even for pilots with little experience of the type.

## The Short answer is the Seawear



Example of simplicity is provided by recovery of maintenance, in terms of maintenance and slow approach.



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## Prop Unbalance Tore Out Engine

The No. 4 engine and propeller of N80947, a Pan American World Airways Boeing 577, towed the aircraft when it fell winging at 1236/ Dec. 6, 1973. The flight was about halfway to Wake Island from Honolulu, T. H., enroute at its assigned altitude of 10,000 feet. Control was assigned after being non-describable difficulties and the flight diverted to Johnston Island. Some of the 35 passengers and seven crew members were injured.

Flight One85 departed San Francisco International Airport at 2345, Dec. 5, 1999, on a scheduled flight to Tokyo. The first intermediate stop was to be Honolulu, and the second Wake Island.

The flight across Honolulu at 0613, Dec. 6. No maintenance of the aircraft was experienced between San Francisco and Honolulu. Except for routine servicing and inspections during the stop at Honolulu, no work was needed. Flight crew was changed.

The flight departed Honolulu International Airport at 0947 under an approved ER type flight plan but in Visual Flight Rules weather. There were 15 passengers and a crew consisting of Capt. E. G. Kelley, First Officer L. B. Newby, Second Officer P. M. Kelley, Flight Engineer W. J. Foster, Purser M. J. Finney, Stewardess F. Lee and Steward B. E. Moore. Gross weight of the aircraft at takeoff was 136,440 lb. (max. gross allowable 144,500 lb.). The load was properly distributed with seating to create 100 percent loads.

The flight was confined until 1735, three hours and 45 minutes after departure, when the crew felt an unusual vibration. At the time, the flight was in clear weather and smoothly so. The vibration built up rapidly and within a minute culminated in an explosive noise and violent jolt. The aircraft went out of control in a rapid descending turn accompanied by violent buckling. The flight was at 28°40' North Latitude and 114°44' West Longitude, almost exactly half way between Honolulu and Wake. The aircraft lost was *Johnston Island*, about 100 nautical miles to the southeast.

Capt Kelly had left the cockpit some time earlier. First Officer Newby who was occupying the right seat noted the vibration. He immediately ordered all propeller systems checked, disconnected the automatic pilot, and flew the aircraft manually. Control surface heaters were not turned on after the automatic pilot was disconnected.

The flight instructor and second officer (who was navigating) climbed from his compartment, forward of the cabin, but did not observe any of the engine running roughs or propeller spinners wobbling. The flight

<sup>†</sup>All times referred to herein are Greenwich Mean Time and listed on the 24 hour clock.

engineer returned to his station and attempted to detect the trouble; none of the engine instruments showed abnormal readings and he was unable to ascertain the source of the vibration.

At the first sign of abnormal operation the captain hurried back to the cockpit. As he recovered the full seat, he glanced over his shoulder at the flight engineer's panel to see if he could detect the trouble. No. 4 engine and propeller fell away at that moment, simultaneously, without suffering harm.

The crowd had come forward to assist ground operations on the galley and saw a flash of fire as No. 6 engine left; he and the second officer called to the flight engineer that No. 6 was gone.

The burning continued during the landing run to the right. The master fire main fire light came on and the fire warning bell sounded, there was no further evidence of fire thereafter, so CO<sub>2</sub> was not used. Power was reduced on the left engine. Full left aileron and rudder tabs were pulled in. Wing flaps were extended about 25 degrees to reduce braking, but were found ineffective; they were then retracted. The combined efforts of both pilots were used to

In an effort to ease the right wing and bring the aircraft under control, the captain ordered fuel dumped from No. 1 tank. The aircraft continued to lose altitude while 2,500 lb of fuel were dumped. Although the crew was unable to regain altitude at 17,000 ft, they did dump again under slowly falling power, and at 16,000 ft consciousness was found which would allow descent and still permit control with the best landing. However, no suitable landing 28 degrees at 145 knots indicated descent and descent was checked at 2,000 ft.

The first officer had been able to transmit a "Mayday" shortly after the engine and propeller had cut. A little later, before disaster was averted, he reported their position to Bluebird and advised the power was over interphone to prepare the passengers for a water landing. Steps had already been

From time to time, Howlands was advised of progress in coping with the conspiracy. At 1245 the flight advised Howlands they were obtaining by mail, Baltimore, Island.

The Search and Rescue organization was immediately alerted after the "Marder." Two aircraft were dispatched from Honolulu and an Air Force aircraft left Johnston Island. Interception was made at 1405 by

miles northwest of Johnston Island. Seafloor  
craft in the vicinity of Johnston Island were

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closed in the flight approach.  
The flight was able to maintain 2,300 feet in Johnson Island and landed at 1932, two hours and 19 minutes after the engine and propeller fell free.

### INVESTIGATION

Weather was not a factor in this accident. The fault was for their weather throughout, with contrary winds along the coast with below flight level. The crew stated that no adverse weather was encountered, and turbulence was light.

Since there was a malfunction in the No. 4 power section, followed very quickly by failure which caused the engine and propeller to tip out, the investigation was directed at determining the cause of the malfunction and reason for the failure.

Investigation by the staff and laboratory tests by engineers from The American, Boeing, Douglas Co., and Hamilton Standard and Fragile One indicated that loss of the engine and propeller could have been caused by (1) failure of the engine, (2) engine clearance in relation of the engine, (3) an undetected structural failure, possibly, or (4) a combination of these. Since the engine and propeller fell in deep water and could not be recovered, there was no opportunity to examine them.

During investigation of the first preliminary check, it was found on examination of the No. 4 engine mount that the top portion of the engine mount was missing. Laboratory examination of the remainder of the dog, an airlock fitting, and a portion of a bracket support tube did not reveal any evidence of fatigue failure. This study showed that all functions apparently had been caused by loads in excess of the design strength. From examination of three perfect parts and the engine mount in ground, it appeared that separation of the engine from the aircraft was downward and to the right.

Loss of No. 4 engine exposed to the elements the large flat plate area of the air vent to which the air ducts attached. This caused drag and buffeting, which, depending on wind speed, could be expected to drop at least from the No. 4 wing tank made it possible to rise the wing.

The landing gear on the right side above the lounge door was damaged by a piece of engine cowling. The door was dislodged with a slight amount of buckling. There was a triangular tear approximately 8 sq. in. in area at Station 206 just forward of the window above the door. Three aluminum alloy members and three struts in this area were damaged, but there was no structural failure. There were no small tears in the top due to the flight wing at Stations 215 and 216; the tear was 21 and 21 in long.

Regarding the second possibility—that of engine engine clearance or misalignment—police disclosed that there have been no known cases of this type accident in which an engine has torn from an aircraft, even at high rates in a crash of engine damage. Investigation of the third possibility, that of propeller failure, revealed that the engine mount on this aircraft showed several signs of structural wear another report from check No. 1 engine was watched out in flight. In this cooperative case, a B-17 of another carrier over Glenview, Ill., in

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of the plane was all carefully controlled.

#### ANALYSIS

As the engine and propeller could not be recovered in study, it was not possible to determine beyond question the cause of malfunction and failure, however, examination of previous accidents of this type and the reference in this notice indicate strong possibility of propeller blade failure. This was based on the character and location of vibration, study of the engine mount, and the possibility that engine failure or its great causal factors could be eliminated as causes.

It has previously been stated that the Americans adopted more stringent engine tests following this accident for operations, inspection, and maintenance of the hollow shaft propellers. In addition to this the cause decided to solve the problem.

hollow shaft blades in favor of replacement with the nickel-plated type, since it was felt that the new blades would give better service. This program of replacement started early in 1954, and the engine assemblies that replacement was in 1955 but will be complete during 1955. In the meantime, the improved procedures relative to the hollow shaft blades will come in effect.

This American has also been testing several vibration pickup units, the purpose of which is to give early warning of excessive vibration as a prearrangement. The pickup for flight engine or pilot to identify the and functioning engine or propeller and to take it out of operation is, therefore, the propeller before engine damage occurs. The results of this testing program have proved promising and the engine plant only install before of such units on its aircraft. A similar unit to detect unusual amounts of vibration

in the propeller is being developed by Hamilton Standard.

The Royal notes to personnel the case for the efficient manner in which they handled a most difficult situation. The investigation is continued all status reports, the passengers of passengers for possible death, and the dropping of fuel, is carried out as accomplished with maximum precision.

#### FINDINGS

On the basis of all available evidence the Board finds that:

1. The cause, the accident, and the crew were carefully controlled.
2. The gross weight of the aircraft upon departure from Hamilton was less than the maximum allowable and the load was properly distributed.
3. Flight Director to Wake Island was routine until 1215, three hours and 40 minutes after departure from Hamilton, when an unusual vibration was noted.
4. Vibration built up rapidly and within the next minute No. 4 engine and propeller was torn from the aircraft while the flight was at its assigned altitude of 13,000 feet.
5. Control of the aircraft was temporarily lost during a right descending turn, accentuated by radio failure.
6. Drooping of fuel hose No. 4 took great control to be repaired after being 7,500 feet altitude.
7. The flight diverted to Johnston Island, landing at 1511, two hours and 56 minutes after loss of the engine and propeller.
8. Instrument records were furnished by the South and Kennebec organizations and also control the flight into Johnston Island.

#### PROBABLE CAUSE

The Board determines that the probable cause of this accident was a propeller shaft failure resulting in an unbalanced condition which tore No. 4 engine from the mount.

#### By The Civil Aeronautics Board

Clay Cursey  
Harvey D. Dewar  
Donald Ryan  
Rich Lott  
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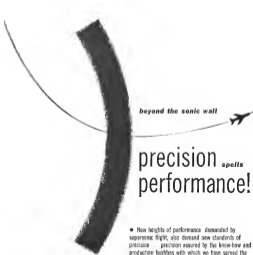
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Capital Airlines is making news with its recently ordered fleet of newly-delivered Viscount Viscounts. Later this year, Trans-Canada Air Lines will put into service its fleet of Viscounts—the first turboprop transports to go into commercial operation in North America. Both airlines have specified Simmonds Precision Fuel Gauge Systems for their Viscounts.

In addition to the ultimate in accurate, reliable gauging of available fuel, the Pacitron installation on the Viscount includes gauging of the water methanol system, as well as provision for fuel limit control (i.e. automatic control of fuel taken aboard in accordance with flight plan requirements.) In specifying Pacitron for their Viscounts, Trans-Canada and Capital are not only selecting the best available fuel gauge systems, both airlines are also confirming their unwavering experience with prior Simmonds fuel gauge installations.

In sum, Pacitron for the Viscount is further evidence of the reason why Simmonds fuel gauges today are flying on more than 70 types of aircraft and with more than 50 U.S. and foreign flag airlines.

**NOTE:** Airlines executives and engineers are invited to visit for the newly published book "Fuel Gauge for Transport Aircraft".

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A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

RESULTS OF AN INTELLECTUAL REVOLUTION . . .

## "The Western Miracle" Continues . . . More Automatic Controls for Industry

Within recent weeks three new monthly technical magazines devoted to automatic control systems for industrial processes and machinery have offered the public their first issues. One of these is **CONTROL ENGINEERING**, a McGraw-Hill publication.

What has caused this surge of interest in the design and application of automatic control systems? What does it portend for the future of American industry? More important, what does it promise for the American standard of living, of which industry is and must be the servant? And what is the role of **CONTROL ENGINEERING** in this development? It is to these questions that this statement is addressed.

### A New Intellectual Revolution

It is frequently asserted that we are now in the throes of a new industrial revolution. The revolution is described as the eliminating of wasteful applications of human labor to repetitive tasks through new technology which makes it possible to transfer those tasks to automatically controlled machinery.

It is perhaps more accurate, however, to say that we are the beneficiaries of a new intellectual revolution in the application of science to industry. This new intellectual revolution points the way toward giant strides in the continuing pro-

cess of taking dull and laborious work off the backs and minds of men and transferring it to machines operating in huge batteries under automatic control.

The practical engineering work required to convert this intellectual revolution into a full-scale industrial revolution, however, is huge part still remains to be done. It is to this task that **CONTROL ENGINEERING** will be devoted. Its role is that of bridging the gap, in engineering and economic terms, between the new conceptions of automatic control of industrial processes and their practical workaday application. These conceptions run the full gamut from systems of control for automatic factories making heavy industrial products to highly personalized systems of automatic control to warn people when they are approaching the breaking point in wearing themselves at the bench or becoming too drowsy to drive their cars safely.

### Enter the "Feed-Back" System

Enough work has been done to move these conceptions out of the realm of interesting dreams and into the realm of practical possibilities, and in some cases into the realm of practical realities. Critical parts of this work were done during World War II when weapons were successfully equipped with "feed-back" systems

that automatically corrected mistakes made by the weapons in locating their targets.

The principle of the "feed-back" system is as ancient as the personal monitor that tells us not to run into each other as we walk along the street. It feeds back to our locomotion machinery the warning of a collision ahead. But the application of the principle to weapon control and then to more general machinery control required superlatively imaginative and skillful scientific development.

When a "feed-back" system that monitors an automatic process and keeps it lined up precisely is teamed up with a computing machine, capable of making lightning calculations that control both what goes into the process and what is done with the product, the harness of automatic control become broad indeed. But in large part they still remain harnesses. A vast mass of practical engineering work remains to be done to realize anything like the full potential of automatic control of industrial processes and machinery.

## More and Better Jobs

There are those who view the surge of interest in automatic control with alarm. They conjure up a situation in which automatic processes will at once expand the ranks of the unemployed and reduce many of those still working in industry to the status of robots or automatons.

A look at the record of the American economy—a record of amazing growth, steadily improving job opportunities and a constantly rising standard of living—demonstrates the basis for such fears. The introduction of new and more efficient industrial machinery and processes obviously cannot be accomplished without creating some disturbance for some individuals and some companies. But consistently the larger range effect of such local and temporary disturbance has been more jobs and better jobs for Americans.

It is no accident that, while the proportion of industrial wage earners in our population is virtually the same as it was in 1920, the pro-

portion of professional and skilled workers has doubled. The proportion of unskilled workers, furthermore, has dropped by half. This has been an essential part of a continuing process by which drudgery has been transferred to machines while the workers who formerly did the drudgery have been graduated to jobs calling for greater competence and providing better pay.

## Higher Living Standard

A British historian, H. J. Hancock, has referred to this general process as "the Western miracle"—that of providing as ever higher and higher standard of living for more and more Americans. The key element in this miracle has been more and more reliance on power-driven machines to get the day's work done.

In the nature of the extremely complicated apparatus involved, full development of systems which have passed through the "think stage" into the status of practical possibilities will be a time-consuming process. It will also be a very exacting process, calling for a tremendous application of engineering skill and ingenuity. However, the engineers who are concentrating on this difficult, workaday phase of the development of apparatus for automatic control will be inspired by the knowledge that they are making a crucial contribution to technical progress which holds great promise of good for the American people.

*This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important economic developments that are of particular concern to the business and professional community served by our industrial and technical publications.*

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that of mid-deposit. Post Office maintains that its overhead cost is higher with the mid-deposit.

• **No index drive for higher intra-day air**—For air shipment of surface mail, undoubtedly, will be opposed by Post Office at the post office.

Post office can also have half the 45 cents a ton-mile the carrier received for normal shipped on the same flight with the surface mail.

• **A recent test on the legality of air shipment of surface mail is in progress**—The post office will attempt to have that change that no shipment of surface mail is a violation of both postal law and the 1930 Civil Aeronautics Act, which could at its local proceeding ordered by CAB.

The Reed's index, however, appears to limit the proceeding strictly to the rate question. The index can be reported to have the only alternative, the costs.

• **Reaching the home-Mexican, Canadian, Undersecretary for Transportation**—Richard M. Jones is attempting to resolve the issue. A senior member of the Transportation Council, Canadian Department's industry, advisory group, is completing a study of the effects of the shipment of surface mail in air in the transportation industry.

The findings and recommendations are scheduled for review by the 67 countries, currently, headed by C. H. Reed, general traffic manager of Union Car and Cable Corp., at a meeting on Oct. 14. The Council reports to Mexico.

It is doubtful that the panel, including both surface and surface representatives, will reach any consensus decision. It is composed of Dr. John Frederick, professor of transportation, University of Minnesota; Thomas, Nicholas Robinson, of Transport Air; Herbert R. Reed, Association of American Railroads; A. B. Robinson, American Trucking Assn.; L. H. Wright, Robinson Corp., and C. D. Williams, Society of Vehicle Engineers.

• **Tracking Problem**—Tracking interests are concerned on to support surface in the fight over first-class mail business. Large tracking firms, interested in the shipment of surface mail and fourth-class mail, trace the same steps as in the airline. This can give the service to Post Office and the public at comparable or cheaper rates.

A report made for the Tracking Assn. by John Belding, former President Postmaster General, stated that all long-haul first-class mail should go by air and all short-haul first-class mail move by truck. • **Real Competition**—Railroads' case that shipment of first-class surface mail in air is illegal is based on three points: • **Postal law sets a rate of three cents in**

surface mail; surface mail will and a recent rate for surface; the Post Office Department has no authority to ship mail on which only the three-cent rate has been paid by air. CAB has altered the Post Office's existing postal law, the post office says.

• **The Civil Aeronautics Act does not provide for voluntary transport of mail by air carrier, as a "take it or leave it" basis.** If mail is to be shipped on a voluntary basis, it is argued, there could result.

• **CAB set rates for the air shipment of**

surface mail without considering the standards laid down in the Civil Aeronautics Act for determining rates to be paid by carriers for mail shipment.

• **Congressional Action**—The current flight appears destined to erupt in Congress early next year.

• **Term World Airlines** was president Thomas Taylor has urged CAB and Post Office "to lend their support" to legislation authorizing the shipment of 20 first-class mail by air. With the backing, he anticipated, Congress may well be negative.

## IATA Urges Navaid Coordination

Committee says airlines can help win government aid by keeping required ground systems to bare minimum.

By Frank Sheu, Jr.

Pass-Committees will be inclined to look more closely toward development of increased navigational facilities and services, once the world's air route network of the surface make a concerted effort to keep required ground systems to a bare minimum consistent with safety and efficiency.

The prediction was made by the International Air Transport Assn.'s technical committee at the organization's recent general meeting here.

• **Navaid Transition**—To meet this challenge the committee expects IATA technical groups will make every effort to bring surface and agreement on surface operational requirements for surface equipment on the basis of which surface or suggest and develop schedules of navigation from old to new communications and navigational systems.

The committee emphasizes that a central communications system should be given both technical and economic in purchasing modern surface equipment is now a problem.

• **Delays on the part of our nation in buying an air traffic control aid can pose serious problems for other countries concerned,** the group says because governments seldom are able to maintain two types of ground systems, one exclusively for air traffic control and one exclusively for navigation.

• **Signs of Trouble**—The lack of effort by the surface already has helped growth in implementing a worldwide system of controlled air traffic and related operations only in Europe, its work in developing adequate air traffic control procedures for certain European airports according to the report.

Other IATA efforts to bring about only introduction of VOR navigational aids in Europe and integrating them with existing MF only air navigation aids by creating "hotspots," the committee says.

It cites the number of VOR navigational aids in service, adding that several other countries have maintained plans for installation of others.

But three long-standing problems of European operations still remain unsolved, despite long consideration the technical group says. These are:

- **Low efficiency radio telephone.**
- **Consistency of civil and military air operations.**
- **Standardization of altimeter setting procedures.**

• **Growing Need**—The present high frequency radio telephone system in the region is not adequate to fill the growing need as it causes into more widespread use by an increasing number of surface and surface units in Europe.

IATA has recommended certain measures to allocate "contending" difficulties and these are being considered by International Civil Aviation Organization and national governments. But the discussion can't move without emphasis of the whole regional system is a "must."

• **Personal Problems**—Much effective coordination of operations of air traffic and those of other forces to prevent interference with each other in becoming an ever-increasing problem, the group reports.

ICAO and IATA have agreed the seriousness of this requirement at highest possible levels with "first intention" at least, but that the importance of the problem has been recognized and will be dealt with by military air director.

The other "hardy perennial" problem, lack of agreement among European countries on standards of air traffic sector pricing procedures for aircraft operations, may be getting somewhat closer to solution.

The committee also refers to certain steps to accept a system recommended by ICAO as the present bottle



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## Trippe Looks Over Viscount, V-1000

LONDON—John T. Trippe, Pan American World Airways' president visited Videtur-Aerobus, Ltd., on his recent trip to England to see a firsthand look at both the Viscount and the new wing V-1000 jet transport.

Belief is that he is weighing the possibility of introducing the Viscount V-1000 into the Pan Am fleet.

Such a sale by Videtur to Pan Am would be a severe blow to Garuda equally, since it would represent a significant setback to Videtur in the competitive rivalry that has developed between the two companies since the Viscount was introduced.

Trippe's interest in the V-1000, however, is considered purely academic at the point because both production and sale of the aircraft are held by the Royal Air Force—with a commercial sale not expected before 1955-1960.

With, with choice of alternate seating procedures still left to individual companies.

■ **Turbine Fuel-Turning** to the airlines search for an steel turbine fuel jet for jet and turboprop aircraft, the technical committee reports that JAL's turbine fuel working group is making encouraging cooperation from all turbine fuel companies and aircraft and turbine manufacturers.

The "JAL" turbine fuel is defined as "which would have the greatest possible cost consistent with other requirements, be no less safe than other fuels, be generally available in the quantity of the world's production, be produced already perfected for other uses, assure reliable and economic engine operation under all conditions applicable to civil jet operations and have in both a best cost per gallon as practicable."

■ **Future Needs—"Up to now"** the committee says, "manufacturers have been practicing as with high performance aircraft and engines for which it was necessary to develop high grade and costly fuels."

"Looking into the future, we are endeavoring to present manufacturers with a specification for a cheap turbine fuel we desire to consume in a new aircraft not as machine customer to be highly tested so that manufacturers will design engines and aircraft for the fuel we want."

"Without this approach, jet engines would stand to consume an even higher proportion of your operating costs than piston engines have up to now."

■ **Proposed Extension**—There are indications

It is considered unlikely, however, of FAA's intention policy of keeping ahead of technical developments that might in any way influence the true Atlantic sea plane picture.

Then too, the U.S. Air Force has been keeping still partly well around an jet transport development on an order to see their de Havilland Comet 3, a proposal of an engine evaluation on the Boeing 707, and now a study of the V-1000.

While full details of the V-1000 are classified, although before it will be a long contest in the transport field it is being up to its performance specifications.

Reported by Jim Bohlman, Crosser began reports that follow about 11,000 B. Stuart, it is reported to cost in the \$100,000 range while carrying a 90,000 passenger load.

At present the competing V-1000 is making completion—FS.

of a need for greater concentration in future on primary of airline pilots, the committee reports.

"The three vital elements of a flight operation can be referred to as the man, the machine and the environment, and a proper balance in the development of these components is pressing need for aviation progress," it is noted.

"Hence, our investigation of man should keep pace with our constant line of technical and operational development."

■ **Tributed to Fat**—While they were simple explosive engines of two between aircraft, without fatal results, the committee reports that the discussion of pilot training during the technical conference at Burbank last May revealed there is a high degree of authority in training standards. Differences in training practices seem to be largely from government requirements, many of which demand that someone time be spent "teaching people to pass government commission tests, rather than in meeting the practical standards required by the operation."

The WTA committee also sees training programs must be tailored to the individual needs of each airline, the committee also discusses a most useful service in "teaching and attempting to curb excessive government regulations to make flexibility of training is essential to assure safety of operation, even though some airlines are in violation and excess government regulations on safety the flexibility, and hence, made more efficient."

■ **Conflicting Campaigns**—Recommendations

have for new licensing rules for aircraft that may help avert "the next lot of lawsuits" imposed of airline personnel have been made to ICAO, the committee reports, as part of a continuing campaign to make better use of the good engineering skill of the airlines.

The IATA principals urge adoption of the idea that responsibility for proper maintenance and aircraft should be vested in the airline itself in a state approved maintenance organization, without the need for having external workmen enter the organization—except for those who actually will certify the records for release from maintenance.

## Stockholder, ALPA Fight Tiger Shutdown

Los Angeles—A Flying Tiger Line stockholder has filed suit to prevent the company from abandoning the airplane business.

In Washington, D. C., meanwhile, Air Line Pilots Assn. is suing to stop in Civil Aeronautics Board's consideration of Tiger's proposed sale from the airline industry, a preliminary action that the airline itself is to complete their merger (Aviation Week Sept. 27, p. 14).

■ **Stock Investment**—Carr E. Bowles of New York, owner of 150 shares of Flying Tiger common stock, filed the injunction suit in the U.S. District Court, Southern District of California, shortly after the airline announced its intention to go into the plane-leasing business.

Bowles charges that thousands of stockholders have invested in FTL on the understanding that the company's business was development of the new generation of aircraft. Although most of valuable good will, some of the increasing potential of the airline business will cause a substantial decrease in the value of large portions of FTL's stock, he says.

■ **Domestic Charge**—Bowles' complaint says FTL's financial statement is misleading a valuable right and asset in the airline business, the first that it leaves stock at the major holding line in the U.S.

It further states that Tiger's plan to leave its stock to stockholders a drastic change in the purpose for which the stock was sold.

The stockholder also claims FTL officers and directors permitted Tiger to leave its stock to stockholders a drastic change in the purpose for which the stock was sold, and that the Civil Aeronautics Act to trade and exchange free values of stock and securities in the form of a large net value of benefits by FTL to stockholders.

which is believed to be in excess of \$5 million out of freight business. He asked the court to hold the Tiger officers personally accountable for the alleged loss of assets and income.

■ **Pilot Protest**—In Washington, ALPA permitted CAB for the night to enter into to protect the interests of pilots at the two airlines.

"To prevent the agreement between the two air carriers without adequate

provision for the preservation of the right of pilots and co-pilots will benefit labor disturbances," the union says. Tiger and Shick insist all their merger benefits the labor provision of the consolidation agreement might cost as high as \$6 million and would result in bankruptcy. Neither ALPA nor the Shick stock, Shick Independent Airways, would agree to relief from this provision.



STANDARD of JAL's expanding wings is new DC-6B landed over in Tokyo. Kojima (second from left) vice president/General Director, by Leo A. Carter, Douglas official.

## JAL Plans Tokyo-Brazil Flights

Japan Air Lines took delivery on its fourth DC-6B last week and immediately made plans to start service from Tokyo to Sao Paulo, Brazil, via San Francisco and New Orleans.

M. Araki, director of civil aviation bureau of the Japanese Ministry of Transportation, told Aviation Week that there have been delays in starting that plan for the airline because of the job of the airlines in Brazil, but that it is hoped scheduled operations can start next April.

■ **New Route**—Araki, who spent two weeks in Washington discussing JAL's proposed extension of service from San Francisco to Los Angeles says that the airline will start looking for a new route to Brazil.

An intended flight to Brazil is scheduled this week—a good will mission to mark the 40th anniversary of the founding of San Paulo. Kojima, Japanese Foreign Minister, will head a group of dignitaries on the visit flight.

■ **Infants**—God—The Japanese airline, now two-thirds owned by the government and one-third by private interests, as a result of increasing capitalization from \$5.5 million to \$9.1 million, has a total fleet of 52.5 for the first month of operations.

Araki says the company needs a 70% lead factor to break even, since it re-

quires no government subsidy. He hopes the figure will be reached in the next fiscal year beginning April 1.

The Japanese aviation official, whose position is equivalent to that of both the Civil Aeronautics Administrator and Civil Aeronautics Board chairman, says the big increase in traffic since February indicates the goal is in sight.

To show his optimism, he points out that JAL booked 100 passengers from the New York area in August, 150 during the first three weeks of September.

Domestic JAL has had its lowest constant load factor of 50%.

■ **Costs**—In Araki says JAL hopes to recover its under two de Havilland Comet 3 in the Mark 1-Ber Tokyo-London airline via India.

However, the Japanese official says the airline is more interested at present in making its Pacific service pay off the 40th anniversary of the weekly Tokyo-San Francisco via the addition of its fourth DC-6B.

Japan hopes to take over air traffic control from Pan Am Air Force bases two years, but Araki says he is having trouble with the government. Controllers must use both English and Japanese, because FEAP will continue to use the language system.

## AVIATION CALENDAR

- Oct. 22—Champion Flight Plan Co., 10th Annual Annual Speed Race and Linton Conference Hotel Hialeah, Florida, Oct.
- Oct. 23—Inventory of Automotive Engineers, National Automobile Club, 10th Annual Production Team and Annual Engineering Display, Hotel Statler, Los Angeles
- Oct. 19-20—Aerosol Industries Assn., symposium on aerosol parts, Cleveland
- Oct. 19-20—American Assn. of Airport Engineers, 25th conference on airport maintenance and operations, University of Kansas, Kansas City
- Oct. 19-20—American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lubrication conference, Lord Nelson Hotel, Baltimore
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- Oct. 19-20—American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lubrication conference, Lord Nelson Hotel, Baltimore
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- Oct.



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Those interested are invited to write Mr. W. W. Davis for a brochure describing life and work at Lockheed and an application form.

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## Praise

I would like to commend you for your consistent editorial stance in the Aug. 9 issue on the American Airlines strike.

It seems to me the Air Line Pilots Ass'n is an organization completely discredited in any responsible person's eyes. It is a corrupt financial organization, greedy for salaries and salaries in addition to the best interests of the flying public. Not only did this organization affect the daily lives of the company, but it has brought the loss of substantial income to the striking pilots themselves. Recently many of the pilots are stockholders in such they suffered losses by the loss to this movement.

Moreover, the employment of several thousand of other American Airlines people has been disrupted because of the long-range travel resulting from the strike. To the ignorance of those should be added the movements by the same against the pilots of other lines for unrelated strike benefits.

Technological advances have created more employment opportunities and will continue to do so unless artificial barriers are arbitrarily imposed.

The airline industry has consistently attempted to keep the market. Money-making must be kept as an underlying motivation of giving the public what it wants and thereby increasing its base. This has been possible within the framework of existing conditions as prescribed by responsible government agencies. If management is kept out of the regulatory area, perhaps the entire system will be dismantled.

For the American Airlines management to have such influence would have been an indication of its status and responsibility to the public, all of its employees and stockholders. For that reason your editorial on ignoring these regulations was timely and well put.

A. H. GORMAN  
Keller Prebook 4 Co.  
New York 1, N. Y.

## He Can't Tolerate It!

Please discontinue any subscription to *American Wings* effective immediately. I do not wish to be associated with a publication so disreputable that it completely outcasts with the AA pilots.

It is time perhaps to think the very less of the editors, but my only disappointment that you would put me, or print me, in 14,000 of your subscribers in real. Expect after this you can see wrong.

W. H. B. Lewis, AA  
445 East Ave.  
La Grange, Ill.

(We are not "completely at odds" with AA, please the editorial regarding the opinion that there were some basic observations on the subject of it strike. We can believe that 21 living options, refusing to break an order point of view but as an individual of the membership of ALPA. Our own customers, accordingly, is not 14,000 but approximately 30,000.—Ed.)

## World-Wide Deliveries

Our company has accomplished several projects, which we feel might be of interest to your readers. Jack Frost, a modified version, delivered a de Havilland Otter across the North Atlantic from Toronto to Delhi via Casco Bay, Loughs, SW, Glasgow, Killybeg, Ireland, and Portree, Scotland. Of course, this was not the first single engine aircraft to cross the Atlantic; however, it was the first from the standpoint of the type of aircraft as well as a means of delivery flight.

Another project which we are just at the point of completing is the delivery of eight Cessna 440 aircraft from San Diego to O'Hare, Indiana, for Cessna Airlines. It is interesting to note that the route flown in the long way around New Diego, New York, London, Cyprus, Sharm El Sheikh, and O'Hare. Even though this route is longer it is felt that it is more economical and expeditious. On the principle flight on route, our crew has made five round the world trips in 1 month, the latest trip being made in 10 days from Los Angeles back to Los Angeles.

This is an amazing feat when you consider that in a previous year we traveled around the world twice in less than time our previous record, around the world flight made prior to World War II. We have delivered two de Havilland Otter aircraft to Canada and expect soon to deliver the first Otter biplane with a suitable gear to that country. At this point we are under contract to deliver four B17 aircraft to Peru for the Peruvian Air Force.

FRANK D. GORDON, Jr.  
Director of Operations  
Frostco, Inc.  
3022 North Hollywood Way  
Los Angeles 47, California  
Burbank, Calif.

## No Loss for CAL

Current numbers of my management include company to you. I'm in the story Aug. 30, 1964, in *Aviation*, Delta City and Company for last year's profits as he served by Delta and Lake County. Additionally was added to the source between Kansas City and Tulsa. This is in addition to our service and a loss.

FRANK D. GORDON, Jr.  
Director of Operations  
Frostco, Inc.  
3022 North Hollywood Way  
Los Angeles 47, California  
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## More on AMC Issue

The issue is another for the American Wings and aviation group service to the Air Force.

A. A. JENNIFER, Colonel USAF  
Special Assistant to the Commander  
Air Research and Development Command  
Baltimore 3, Md.

Congratulations on the magazine and the importance of your report AMC. In fact, General McNamee has made it a point to read the same of our people

and to find and it is accurate that we supply some additional copies.

Can you give this to the Air Force appropriate department with the request that 20 additional copies, and letting the same, be sent to my attention?

Again, congratulations for a job very well done.

EDWARD F. JONES  
Assistant to the President  
Cessna  
San Diego 17, Calif.

I should like to express my sincere appreciation for the wonderful manner in which you portrayed the activities of the Air Force Command.

NANCY WILKINSON  
Colonel, USAF  
Commander  
Wichita Air Force Depot  
Shafter, Ohio

This will be a fine reference book and I am glad to have a copy of it.

M. P. PRINCE, President  
Aviation Aviation Corp.  
Pittsburgh 13, Pa.

It is very thoughtful of you to send me one of the first copies of *American Wings*. August 16 *AMC* edition, and I appreciate it. I have found it very interesting.

FRANK D. GORDON, Jr.  
Director of Operations  
Frostco, Inc.  
3022 North Hollywood Way  
Los Angeles 47, Calif.

Without compliments on your "An Aircraft Command Edition," an outstanding issue from every point of view.

If I were a JFO in the USAF or the AMC, I would bring the editor to the attention of the Commander of the Commander of the Department with the suggestion that a historical review from the magazine would give Delta and Lake County. Additionally was added to the source between Kansas City and Tulsa. This is in addition to our service and a loss.

FRANK D. GORDON, Jr.  
Director of Operations  
Frostco, Inc.  
3022 North Hollywood Way  
Los Angeles 47, California  
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FRANK D. GORDON, Jr.  
Director of Operations  
Frostco, Inc.  
3022 North Hollywood Way  
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You and your staff deserve all praise for the issue featuring the Air Force Command. This is truly an outstanding job.

Don RICHARDS, Executive Secretary  
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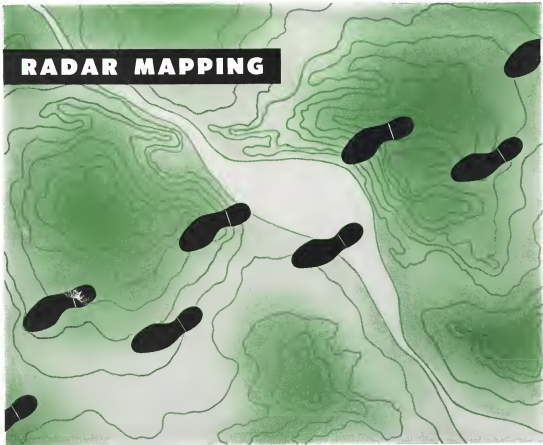
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